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RESEARCH INSTITUTE, NEW DELHI

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

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VOL. VI.—ELEVENTH SERIES.

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exculta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . The sylvan powers
Obey our summons; from their deepest dells
The Dryads come, and throw their garlands
And odorous branches at our feet; the Nymphs
That press with nimble step the mountain-thyme
And purple heath-flower come not empty-handed,
But scatter round ten thousand forms minute
Of velvet moss or lichen, torn from rock
Or rifted oak or cavern deep: the Naiads too
Quit their loved native stream, from whose smooth face
They crop the lily, and each sedge and rush
That drinks the rippling tide: the frozen poles,
Where peril waits the bold adventurer's tread,
The burning sands of Borneo and Cayenne,
All, all to us unlock their secret stores
And pay their cheerful tribute.
J. TAYLOR, *Norwich*, 1818.

ALERE FLAMMAM.

CONTENTS OF VOL. VI.

[ELEVENTH SERIES.]

NUMBER 31.

Page

I. Entomological Expedition to Abyssinia, 1926–7. Coleoptera, *Scarabæidæ*. By HUGH SCOTT, Sc.D. (Department of Entomology, British Museum (Natural History)) 1

II. Entomological Expedition to Abyssinia, 1926–7. Coleoptera, *Corylophidæ*. (Contribution to the Study of the *Corylophidæ*, I.) By RENAUD PAULIAN (Laboratoire d'Entomologie, Muséum d'Histoire Naturelle de Paris) 26

III. Preliminary Descriptions of Twenty-one new Species of Pelagic Penæidea (Crustacea Decapoda) from the Danish Oceanographical Expeditions. By MARTIN D. BURKENROAD, Bingham Oceanographic Laboratory, Yale University 35

IV. Two new *Acrididæ* from Afghanistan. By B. P. UVAROV, D.Sc., British Museum (Natural History) 54

V. Størmer on the Appendages of Trilobites. By Prof. W. GARSTANG, M.A., D.Sc., Oxford 59

VI. The *Otitidæ* and *Phytalmiidæ* of the Solomon Islands (Diptera). By JOHN R. MALLOCH, Arlington, Va. (Plate I.) 66

VII. Notes on the Nomenclature of Fossil Fishes. Part II. Homonyms D–L. By ERROL I. WHITE, D.Sc., British Museum (Natural History), and J. A. MOY-THOMAS, M.A., Department of Zoology and Comparative Anatomy, Oxford 98

VIII. The Lice of Petrels.—Part III. The Genus *Pelmatocerandra*. By GORDON B. THOMPSON. (Plate II.) 103

IX. Twenty-four new Generic Names in Orthoptera. By B. P. UVAROV, D.Sc., British Museum (Natural History) 112

X. Descriptions of new Species of *Limacodidæ*. By R. J. WEST. (Plate III.) 117

New Book:—A Facsimile of R. H. Beddome's Articles on Indian Reptiles, 1862–1870 128

NUMBER 32.

Page

XI. The Ordovician Trilobite Fauna of the Shelve-Corndon District, West Shropshire.—Part II. *Cyclopygidæ, Dionididæ, Illænidæ, Nileidæ.* By W. F. Whittard, D.Sc., Ph.D. (Plates IV.–VII.) ... 129

XII. New Ordovician Fossils from Girvan, Ayrshire. By F. R. C. Reed, M.A., Sc.D., F.G.S. (Plate VIII.) ... 154

XIII. Buprestides nouveaux. Par A. Théry ... 160

XIV. On some Fishes of the Genus *Acanthophthalmus*, with Description of a new Species. By A. Fraser-Brunner ... 170

XV. Descriptions and Records of Bees. CLXXX. By T. D. A. Cockerell, University of Colorado ... 176

XVI. Études sur quelques *Scydmænidæ* de Bornéo et des Îles Fiji. Par Jean Lhoste ... 186

XVII. New or little-known *Tipulidæ* (Diptera).—LVIII. Neotropical Species. By Charles P. Alexander, Ph.D., F.R.E.S., Massachusetts State College, Amherst, Massachusetts, U.S.A. ... 194

XVIII. New Genera and Species of *Hemerobiidæ* (Neuroptera). By D. E. Kimmins, Department of Entomology, British Museum (Natural History) ... 222

XIX. On some new Brazilian *Microcylloepus*, with a Key to the Species (Coleoptera, *Elmidæ*). By H. E. Hinton, Ph.D. (Department of Entomology, British Museum (Natural History)).. 236

XX. On the Occurrence of *Gammarus* (*Marinogammarus*) *obtusatus* Dahl and *G. finmarchicus* Dahl (Crustacea, Amphipoda), new to Ireland. By Ranald MacDonald ... 247

New Book :—L. H. Hyman. The Invertebrates: Protozoa through Ctenophora ... 248

NUMBER 33.

XXI. On some Jurassic Specimens of *Sagenopteris*. By Tom M. Harris, University of Reading ... 249

XXII. The North American Genera of the Dipterous Subfamily *Chamæmyiinæ*. By John R. Malloch ... 265

XXIII. Neue Malacodermata aus der Sammlung des British Museum.—9. Beitrag zur Kenntnis der indo-malayischen Malacodermata. Von W. Wittmer, Zürich ... 274

XXIV. Some Notes on the Biology of the Copepod *Diaptomus castor*. By Robert Gurney ... 277

XXV. New Papuan Fishes. By Ethelwynn Trewavas, D.Sc., British Museum (Natural History) ... 284

Page

XXVI. On *Gammarus* (*Pectenogammarus*) *planicrurus*, subgen. et sp. n. (Crustacea, Amphipoda). By D. M. Reid, Department of Biology, Harrow School 287

XXVII. Some Additional Pliocene Fossils from Cyprus. By F. R. Cowper Reed, Sc.D., F.G.S. (Plate IX.) 293

XXVIII. Entomological Expedition to Abyssinia, 1926–7. Coleoptera, *Psephenidæ*, *Dryopidæ*, *Elmidæ*. By H. E. Hinton, Ph.D. (Department of Entomology, British Museum (Natural History)) 297

XXIX. Description of a new Race of Puma (*Puma concolor*), with a Note on an Abnormal Tooth in the Genus. By R. I. Pocock, F.R.S., Zoological Department, British Museum (Natural History). 307

XXX. A new Species of the Nematode Genus *Macropostrongylus*. By H. A. Baylis, M.A., D.Sc., Department of Zoology, British Museum (Natural History) 313

XXXI. A Note on certain Genera of Brenthid Coleoptera and Description of a new Species. By Gilbert J. Arrow, British Museum (Natural History) 318

NUMBER 34.

XXXII. *Timanthes* Stål and *Pirmeda*, gen. nov. (Orthoptera, *Tettigoniidæ*). By G. M. Henry, Assistant in Systematic Entomology, Colombo Museum. (Plate X.) 321

XXXIII. Three Species of Amphipoda (Crustacea) new to Britain. By D. M. Reid, Department of Biology, Harrow School.. 335

XXXIV. Insects of the Lake Rudolf Rift Valley Expedition, 1934.—2. Coleoptera. By D. R. Buxton 337

XXXV. The Races of Geoffroy's Cat (*Oncifelis geoffroyi*). By R. I. Pocock, F.R.S. (Zoological Department, British Museum).... 350

XXXVI. Entomological Expedition to Abyssinia, 1926–7: Woodlice collected by Mr. J. Omer-Cooper. By K. H. Barnard, D.Sc., F.L.S. (Assistant Director, South African Museum, Cape Town) 355

XXXVII. On some African Specimens of *Phrynichus* Karsch (Arachnida, Pedipalpi). By R. J. Whittick, B.Sc., Department of Zoology, British Museum (Natural History) 366

XXXVIII. Eleven new Generic Names in Orthoptera. By B. P. Uvarov, D.Sc., British Museum (Natural History) 377

XXXIX. Australian *Buprestidæ* and the Junk Catalogue. By H. J. Carter, B.A., F.E.S. 380

XL. Notes on the Plectognath Fishes.—IV. Sexual Dimorphism in the Family *Ostraciontidæ*. By A. Fraser-Brunner 390

NUMBER 35.

Page

XLI. A Synopsis of the Bolivian Species of *Cyllœpus* Er. (Coleoptera, *Elmidæ*). By H. E. Hinton, Ph.D., Department of Entomology, British Museum (Natural History) 393

XLII. A List of the Type-hosts of the Mallophaga and the Lice described from them. By Gordon B. Thompson .... 409 •

XLIII. *Chloropidæ* (Diptera) of the Oriental Region: Notes and Synonymy. By Curtis W. Sabrosky, Michigan State College, East Lansing, Michigan 418

XLIV. Mallophagan Miscellany.—Part I. By Theresa Clay, B.Sc. .... 427 •

XLV. Notes on Bermudan Nemerteans: *Gorgonorhynchus bermudensis*, sp. n. By J. F. G. Wheeler, D.Sc. 433

XLVI. On some Oligochæta from Palestine. By Dr. L. Cernosvitov, British Museum (Natural History) 438

XLVII. A new Snake of the Genus *Anomochilus* from the Malay Peninsula. By Malcolm A. Smith, Department of Zoology, British Museum (Natural History) 447

XLVIII. *Hispinen* aus dem Britischen Museum.—III. Teil. Amerikaner. 84. Beitrag zur Kenntnis der *Hispinen* (Coleoptera, *Chrysomelidæ*) Von Erich Uhmann, Stollberg, Erzgebirge 449

XLIX. A Palæoniscid Fish (*Elonichthys davidi*, sp. n.) from the Newcastle Coal Measures, New South Wales. By Sir Arthur Smith Woodward, F.R.S. (Plate XI.) 462

NUMBER 36.

L. New Species of the Cirripede Genus *Oxynaspis*, commensal with *Antipatharia*. By A. K. Totton, Department of Zoology, British Museum (Natural History) 465

LI. Preliminary Key to the "*Petrejus*" Section of the Genus *Passalus* (Coleoptera, *Passalidæ*). By W. D. Hincks, M.P.S., F.R.E.S. 486

LII. New Species of *Proctotrupoidea*. By G. E. J. Nixon, B.A., Imperial Institute of Entomology 497

LIII. Notes on the Mallophaga of Aquatic Birds.—I. Mallophaga from Divers (Gaviiformes). By Gordon B. Thompson .... 513 •

LIV. Two new Orthoptera from Turkey. By B. P. Uvarov, D.Sc., British Museum (Natural History) 522

LV. The Perciform Genera *Gymnapogon* and *Nannatherina*. By C. Tate Regan, D.Sc., F.R.S. 527

New Books:—Heredity. By A. Franklin Shull 531

General Physiology. By Philip H. Mitchell .... *ib.*

Index 533

PLATES IN VOL. VI.

PLATE I. Diptera of the Solomon Islands.
II. Pelmatocerandra setosa (Giebel), ♀.
III. New species of Limacodidæ.
IV. } Cyclopyge.
V. }
VI. Phylacops, Dionide, Illænopsis.
VII. Ectillænus.
VIII. New Ordovician fossils from Girvan.
IX. New Pliocene gastropods from Cyprus.
X. Pirmoda tenmalaia, gen. et sp. n., ♂ and ♀ (living).
XI. Elonichthys davidi, sp. n.

THE
ANNALS AND MAGAZINE
OF
NATURAL HISTORY.

[ELEVENTH SERIES.]

> " ....per litora spargite muscum,
> Naiades, et circùm vitreos considite fontes:
> Pollice virgineo teneros hic carpite flores:
> Floribus et pictum, divæ, replete canistrum.
> At vos, o Nymphæ Craterides, ite sub undas
> Ite, recurvato variata corallia trunco
> Vellite muscosis e rupibus, et mihi conchas
> Ferte, Deæ pelagi, et pingui conchylia succo."
>
> *N. Parthenii Giannettasii*, Ecl. 1.

No 31. JULY 1940.

I.—*Entomological Expedition to Abyssinia*, 1926–7. *Coleoptera*, Scarabæidæ. By HUGH SCOTT, Sc.D. (Department of Entomology, British Museum (Natural History)).

THE Scarabæidæ enumerated in this paper were collected mainly by myself and Mr. J. Omer-Cooper during our Expedition from September 1926 to February 1927. A collection made subsequently at Dire Dawa by Mr. H. Uhlenhuth early in 1935 is, however, included. In every species, too, I have consulted the material previously in the British Museum and have added records of any specimens of these species from Abyssinia which are forthcoming; thus, a number of specimens collected in 1904 by my friend the late Philip C. Zaphiro, others obtained in the region of Lake Tana [Tsana] in 1902 by Degen, and specimens due to still other collectors, are here recorded for the first time.

It has not been attempted to draw up a list of all the species known from Abyssinia. Such a task is beyond my scope at present, and, moreover, the list would be unsatisfactory from a biogeographical standpoint, because many of the old records lack precision, so that it is impossible to know whether the insects were obtained at high or low altitudes, or in what type of country. In the present paper, on the other hand, these matters are clearly indicated.

Though I have critically examined specimens of many species, my part in drawing up this report has been principally that of a compiler. The determination of the species was undertaken by Mr. G. J. Arrow, by whom samples of many species were submitted to M. Renaud Paulian (Paris). The results of M. Paulian's examination are seen chiefly in the subfamilies Orphninæ, Aphodiinæ, and Coprinæ (part). The Rutelinæ were submitted to Dr. F. Ohaus (Mainz), and certain Cetoniinæ to the late F T. Valck Lucassen of Vorden, Holland. My colleague Mr. Everard B. Britton dissected and examined the genital armatures of certain species. I am greatly indebted to all these helpers.

It has not proved necessary to describe any species as new to science. A new variety of a Cetoniine (*Heterostetha kristenseni* Moser, var. *viridipennis*, n.) is described by Mr. Arrow, p. 7. *Aphodius corniculatus* Bouc., subsp. *scotti*, n., had been described already by M. Paulian in 1939, but is included on p. 14. The opportunity is taken by Mr. Arrow to publish on p. 11 a note on the genus *Dichecephala* Brenske.

Bibliographic references are as a rule omitted, but in each subfamily of which a standard Catalogue is extant the full title of this is given under the heading of the subfamily, and an abbreviated reference to the Catalogue is then added after the name of each species.

Examples of 52 species were obtained by the Expedition of 1926–7, while the addition of the Uhlenhuth collection brings the number dealt with up to 86 (named varieties collected in addition to the type-form of their respective species are not counted separately here). Among the ten subfamilies represented, Aphodiinæ and Coprinæ have far the largest number of species. In particular, in the material collected by Mr. Omer-Cooper and the writer, Aphodiinæ far exceed any other subfamily in the number of species obtained. It may be recalled that we trekked from camp to camp with many mules and horses, sometimes halting at the recognized stopping-places of caravans, while, when we stayed in one place for days or weeks, the riding- and pack-animals grazed near our camp; therefore suitable provender for Aphodiinæ, that is, dung of horses, mules and donkeys, was usually plentiful.

BIOGEOGRAPHICAL. Many of the species are widely distributed in East Africa, some in South Africa as well, while others range over the whole of Africa south of the Sahara, or even more widely still. Yet a considerable number, about 31 forms (including the variety and the subspecies new to science), are known either from Abyssinia alone, or from Abyssinia and countries immediately adjacent (Eritrea and Somaliland). Some of these are probably endemic to this part of Africa.

The large and rather conspicuous rose-chafer *Pachnoda massajæ* is an instance of a species known only from Abyssinia and Somaliland, but having a counterpart, a distinct but closely allied species (*P. thoracica* F.), in Southern Arabia. Detailed records indicate that these two species occur, in their respective areas, at medium altitudes. Thus, the specimens of *P. thoracica* collected by the writer and Mr. Britton in South-Western Arabia in 1937 were taken at 3800 and 5200 feet; while those of *P. massajæ* recorded below from Abyssinia were collected at 4500 feet. Other examples of "opposite numbers," occurring on opposite sides of the Red Sea and Gulf of Aden, will doubtless come to light as the collections of the British Museum Expedition to South-Western Arabia are studied and compared with those of the Abyssinian Expedition.

As to the distribution of the species within Abyssinia, while some range through several zones of altitude, there is often a clear distinction between those which were collected in the middle altitudes, from 3500/4000 up to nearly 8000 feet, and those which were found at 8000 feet and upwards. For example, out of five species of *Onitis*, three were found only in the Muger Valley at 5500 feet (one of them in considerable, another in very large, numbers), while the other two were collected only in places between 8000 and 9500 feet above sea-level. Some of the species of *Aphodius*, on the contrary, were found both in the middle altitudes and up to 10,000 feet.

Other special features in the biology of the species may be noted as follows :—

ATTRACTION TO LIGHT. Specimens of the following flew to light (lamps or candles) during the last weeks of the Great Rains :—*Rhinyptia rostrata*, *Trochalus* sp., *Ochodæus ciliatus*, *Orphnus galla*, *Hybosorus illigeri*, *Aphodius corniculatus scotti*, *A. calcaratus*, *A. humilis*, *A. lacunosus*, *A. lividus*, *A. rugulicollis*, *Rhyssemus granosus*, *Onthophagus* sp. With one exception, all the above records are accounted for by specimens (one or more of each species) which flew to a powerful petrol-lamp at the Hawash railway station, ca. 3500 feet, on the night of September 2nd, 1926, during our upward journey to Addis Adaba ; insects came to this lamp in quantities, faster than we could catch them. Though that evening was fine, the rains were still in progress, and continued so for about a month afterwards *. The exception is *Aphodius corniculatus scotti*, of which several specimens flew to candle- or lamp-light at Jem-Jem Forest, 8000 feet, during the first ten days of October.

ASSOCIATION WITH PLANTS. More than 40 examples of the large rose-chafer *Pachnoda stehelini* were collected from foliage of garden roses at Addis Ababa on September 5th, 1926. A single specimen of the Cetoniine *Anelaphinis simillima* was obtained from flowers of the tree *Cordia abyssinica*, at Doukam in October ; the large trusses of white flowers of this, the *wanza* tree, are also very attractive to bees.

A specimen of *Saprosites* sp. (*S. cavus* ?) was taken from decayed parts of a growing tree-Euphorbia in Jem-Jem Forest in September. It can, however, only be regarded as an accidental visitor, not exclusively associated with these plants.

---

* Certain Carabidæ also flew to the lamp at Hawash on that evening, viz. *Cymbionotum schuppeli* (Dej.) and *Anisodactylus ochropus* Dej. (?) ; see Alluaud, Ann. & Mag. Nat. Hist. (10) xix. pp. 274, 285 (1937). The paper cited also includes records of specimens of *Crasodactylus punctatus* Guér. and *Glycia rufolimbata* Maindr. taken at light a few days previously, August 28th, at the Hôtel Continental, Djibouti (*op. cit.* pp. 285–6). The insects attracted to the lamp at Hawash also included Myrmeleonidæ (see Esben-Petersen, Ann. & Mag. Nat. Hist. (10) i. pp. 443–5, 1928), Orthoptera, Homoptera, moths, winged ants, etc.

Scarabæidæ.

CETONIINÆ.

The abbreviation "Cat." in the bibliographic references under this subfamily refers to S. Schenkling, Coleopterorum Catalogus, Pars 72 (Scarabæidæ: Cetoniinæ), 1921.

Pachnoda stehelini Schaum; Cat. p. 294.

Loc. Abyssinia: Addis Ababa, over 8000 feet, 5. ix. 1926, from foliage of garden roses, 46 ex. (*Scott*); near Addis Alam, ca. 8000 feet, 18–20. ix. 1926, 3 ex. (*Omer-Cooper, Scott*); between Jem-Jem Forest and Wouramboulchi, 30. ix. 1926, 1 ex. (*Omer-Cooper*); Addis Ababa, 1. 1927, 1 ex. (*Scott*); Lake Haramaiya, ca. 6600 feet, iv. 1935, 1 ex. (*Uhlenhuth*).

This handsome dull green rose-chafer, with yellow marginal markings, is not recorded from any country but Abyssinia. The British Museum has a series from Zegi, on the southern shore of Lake Tana [Tsana], collected in 1902 (*Degen*).

Pachnoda massajæ Gestro; Cat. p. 290.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, v. 1935, 2 ex. (*Uhlenhuth*).

This species apparently occurs, on the whole, at lower altitudes than the preceding. It was described from Shoa. The British Museum has several specimens labelled "Abyssinia" without further data, and one from Harar; also a series from British Somaliland, including one from "Goolis Mts., inland from Berbera" (1898, *E. Lort Phillips*), and a number from Bulhar (about 1911, *R. E. Drake-Brockman*).

The species, characterized by its ochreous prothorax, and dark reddish-brown elytra with blackish markings along the base and the suture, has been confused with *P. thoracica* F., which occurs in Southern Arabia *. The latter has more uniformly dark elytra, and is without the white markings, on the sides of the thorax and abdomen beneath, which characterize *P. massajæ*.

---

* This confusion of the two forms led to the sinking of *P. massajæ* as a synonym of *P. thoracica* by P. N. Schürhoff, "Revision der Gattung *Pachnoda*," Bull. & Ann. Soc. ent. Belgique, 78, p. 189, 1938.

Rhabdotis sobrina Gory & Perch. ; Cat. p. 299.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iv. 1935, 2 ex. (*Uhlenhuth*).

The British Museum Collection contains examples from South-Eastern Abyssinia and British Somaliland (1908 and earlier, *R. E. Drake-Brockman*). The species is widely distributed on the eastern side of the continent from the Sudan to Southern Rhodesia.

Anelaphinis simillima Ancey ; Cat. p. 306.

Loc. Abyssinia : Doukam, 6500–7000 feet, 19. ix. 1926, from flowers of a tree (*Cordia abyssinica*), 1 ex. (*Scott*).

This species is recorded only from Abyssinia. The British Museum has a series from Harar (*Kristensen*), and specimens from South-Eastern Abyssinia (1908, *Drake-Brockman*) and Walamo (*von Erlanger* and *Neumann*, 1900).

Anoplochilus sp.

Loc. Abyssinia : Mt. Zukwala, ca. 9000 feet, 25–26. x. 1926, 1 ex. (*Omer-Cooper*).

This genus is represented by species in various parts of East, Central, and South Africa, and " Haut-Sénégal."

Trichothyrea mulsanti Guér. ; Cat. p. 323.

Loc. Abyssinia : near Addis Alam, ca. 8000 feet, 18–19. ix. 1926, 13 ex. (*Omer-Cooper*) ; Jem-Jem Forest, 8000-9000 feet, 24–29. ix. 1926, 21 ex. (*Scott*) ; between Jem-Jem and Wouramboulchi, 8000–9000 feet, ix–x. 1926, 9 ex. (*Omer-Cooper*) ; Mt. Chillálo, ca. 8000 feet, 11 and 26. xi. 1926, 2 ex. (*Scott*) ; Lake Haramaiya, ca. 6600 feet, iv. 1935, 1 ex. (*Uhlenhuth*).

The specimens of this small rose-chafer in the long series collected by us are all brilliant metallic green or slightly bronze-coloured. Some of those in the British Museum are darker, with a metallic blue shade. The species was described from Abyssinia, but has been also recorded (according to the Catalogue) from Zanzibar. All the British Museum specimens are from Abyssinia, including Harar, and South-Eastern Abyssinia.

HETEROSTETHA Moser,

Ann. Soc. ent. Belg. lv. p. 123, 1911 ; Cat. p. 334.

This genus, closely resembling *Leucocelis*, was erected for a single species, the following, of which a new variety is here described.

Heterostetha kristenseni Moser, var. *viridipennis*, n.

Heterostetha kristensi Moser, *l. c.* (printed thus in the original description, emended to *kristenseni* in the Catalogue).

This variety differs from the typical form in having the elytra green—olive-green in some specimens, deep grass-green in others—instead of black. The scattered white spots are slightly smaller, but these vary so much that no importance can be attached to them. *H. kristenseni* is the only known species of the genus, which differs from *Leucocelis* in the rather long mesosternal process. The male has a slight inward prolongation of the extremity of the hind tibia, forming a kind of hook (G. J. ARROW).

Loc. Abyssinia : Jem-Jem Forest, 8000–9000 feet, 22. ix.–10. x. 1926, 6 ex. (*Scott* and *Omer-Cooper*).

The species is only known from Abyssinia. In the typical form a single male (the type) was obtained at Jakka [probably a place about 50 miles west of Harar], ix. 1910 (*G. Kristensen*), and the British Museum has three specimens from the extreme south, from Das, in the Boran Country, about 60 miles north-east of Moyale [which is just over the frontier of Kenya], 21. x. 1911 (*R. J. Stordy*).

CENTRANTYX Fairmaire.

The three specimens here recorded, representing two species of this genus, were submitted to the late F. T. Valck Lucassen, of Vorden, Holland, in August, 1939, and were determined by him ; after his regretted death on September 17th, they were returned by Mr. B. H. Klynstra in November of the same year, with Valck Lucassen's determination-labels attached.

Representatives of *Centrantyx* appear to be rare in collections, for Valck Lucassen published in 1935 ('Entomologische Berichten,' Amsterdam, ix. pp. 163–171) a paper on the genus, in which he wrote that he had succeeded in getting together only nine individuals.

Eight of these were of the female sex, and it is noteworthy that the three additional specimens recorded below are also female. Nevertheless Valck Lucassen described five new species and redescribed *C. raffrayi* Fairm., on which Fairmaire originally based the genus in 1884, and which had remained till 1935 its solitary representative. All the six species known to date are recorded from Abyssinia, except one, the distribution of which is doubtfully given as " India."

Centrantyx nitidus Valck Lucassen, *op. cit.* p. 167.

Loc. Abyssinia: Jem-Jem Forest, 8000–9000 feet, 22–26. ix. 1926, 1 ♀ (*Scott*). The type (♀) was from " Vallis Erer" (probably the Errer district of the Hawash valley, north-west of Dire Dawa) in Abyssinia.

Centrantyx tibialis Valck Lucassen, *op. cit.* p. 170.

Loc. Abyssinia: Jem-Jem Forest, 8000–9000 feet, 23–26. ix. 1926, 1 ♀, and 7–9. x. 1926, 1 ♀ (both *Scott*). The type of the species, a ♀, was from Burka, Abyssinia, and Lucassen also recorded a second example (♀) with some doubt from Natal.

Diplognatha silicea Macleay.

Diplognatha gagates Forster, var. *silicea* Macleay; Cat. p. 345.

Loc. Abyssinia: Addis Ababa, over 8000 feet, 8. ix. 1926, in a garden, 1 ex., and a second from the same place, xii. 1926 (both *Scott*); Jem-Jem Forest, ca. 8000 feet, 25–29. ix. 1926, 1 ex. (*Scott*); Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 4–7. x. 1926, 1 ex. (*Omer-Cooper*).

The British Museum has an old specimen from Zegi, on the southern shore of Lake Tana [Tsana], 1902 (*Degen*). The form *silicea* is widely distributed in Eastern, Central, and South Africa.

Cœnochilus glabratus Boh.; Cat. p. 369.

Loc. Abyssinia: Lake Haramaiya, ca. 6600 feet, iv. 1935, 1 ex. (*Uhlenhuth*).

Widely distributed in Tropical and Southern Africa. As far as I am aware, the species has not been previously recorded from Abyssinia.

DYNASTINÆ.

The abbreviation "Cat." refers to G. J. Arrow, Scarabæidæ: Dynastinæ; Coleopterorum Catalogus, Pars 156, 1937.

Heteronychus impudens Jack ; Cat. p. 30.

Loc. Abyssinia : Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 4–7. x. 1926, 8 ex. (*Omer-Cooper*).

This species is known only from Abyssinia. It was described from a single specimen collected at the Akaki River near Addis Ababa, 23. x. 1904 (*P. C. Zaphiro*). Nine specimens in the Genoa Museum, taken at several places in Shoa, have been referred to it by G. Paoli (Boll. Soc. ent. Ital. lxvi. p. 51, 1934). The genus *Heteronychus* comprises many species, closely alike, from various parts of Tropical and South Africa, and a few from Madagascar and the Oriental Region.

Temnorrhynchus clypeatus Klug ; Cat. p. 56.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, v. 1935, 1 ex. (*Uhlenhuth*).

An East African and South African species. I know of no other record from Abyssinia.

Oryctes boas F. ; Cat. p. 68.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii. 1935, 4 ♂, 4 ♀ (*Uhlenhuth*).

Tropical and South Africa, and Madagascar.

Rhizoplatys bituberculatus Klug ; Cat. p. 82.

Loc. Abyssinia : Mt. Chillálo, ca. 8000 feet, 6–8. xi. 1926, 1 ex. (*Scott*).

Recorded from Mozambique and Southern Rhodesia ; the British Museum series includes a specimen labelled "Abyssinia" without precise data, and examples from Nyasaland, etc.

RUTELINÆ.

Rhinyptia rostrata Burm.

Loc. Abyssinia : Hawash railway station, ca. 3000 feet, 2. ix. 1926, 6 ex., at light (*Omer-Cooper*).

This, the only species of the subfamily obtained during the Expedition, is recorded from the Sudan and the French Somali Coast (Obok). The determination of the specimens is due to Dr. Fritz Ohaus.

The specimens recorded above were taken at a moderate altitude, on the journey up from Djibouti to Addis Ababa. Probably most Rutelinæ in Abyssinia occur at low or medium altitudes, far below the high zones in which most of the time was spent during the Expedition. Thus, seven species were obtained by Uhlenhuth at Dire Dawa, ca. 4500 feet, i–iv. 1935. These have been submitted to Dr. Ohaus who has described three of them (two species of *Anomala* and one of *Adoretus*) as new; since, however, the descriptions have not yet (xi. 1939) been published, I do not give the specific names. The other four collected by Uhlenhuth at Dire Dawa are: –*Anomala* (*Aprosterna*) *ismeria* Ohaus, 1925 (East Africa); *Anomala munda* Benderitter, 1928 (Italian Somaliland); *Adoretus vestitus* Reiche (apparently only known from Abyssinia); and *Adoretus hybogeneius* Ohaus, 1930 (Sudan).

MELOLONTHINÆ.

Schizonycha squamosa Raffray.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, ii. and v. 1935, 2 ex. (*Uhlenhuth*); a third example, considerably smaller, collected at the same locality, i. 1935, is referred with some doubt to this species.

S. squamosa was described from Abyssinia. The specimens from Dire Dawa agree closely with specimens from Somaliland, determined many years ago by Mr. Arrow (see Proc. Zool. Soc., 23. i. 1900, p. 24).

Schizonycha nigrofusca Arrow, Proc. Zool. Soc., 23. i. 1900, p. 24.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, iii. 1935, 8 ♂, and v. 1935, 2 ♀ (*Uhlenhuth*).

I have seen for comparison only the original type female, from Somaliland. Among the ten specimens from Dire Dawa, the eight males have the abdomen slightly depressed beneath and the club of the antenna much longer than in the two females In the type, which was proved to be a female by dissection, the club of the antenna is intermediate in length. This caused me some hesitation in referring the specimens from Dire Dawa to this species, but I can see no other differentiating character, and Mr. Arrow has confirmed my view that they should be referred to *S. nigrofusca.* A specimen (♂) from the Sudan (near the confluence of the Dinder River with the Blue Nile, 26. vii. 1909, *S. S. Flower*) is also provisionally referred to *S. nigrofusca.*

Trochalus sp.,

Two specimens, about 5 mm. long and reddish-testaceous, are mentioned here, though the species must be left undetermined.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix. 1926, 2 ex. at light (*Omer-Cooper*).

The material collected by H. Uhlenhuth in 1935 includes two other species of *Trochalus* : a small dark one from Dire Dawa ; and a much larger form represented by specimens both from Dire Dawa (4500 feet) and from Lake Haramaiya (ca. 6600 feet). The latter closely resembles the East African *T. ukerewius* Kolbe. There are also several specimens of a species of *Serica* (*sens. lat.*) from Lake Haramaiya and Dire Dawa. Owing to the present lack of specialists on Old World representatives of the Melolonthinæ these species must be left at present unidentified.

Note on the Genus *Dichecephala* Brenske.

A genus was constituted by Brenske in 1895 (Ann. Mus. Civ. Genova, xxxv. p. 219) for an insect which he called *Dichecephala abyssinica*, without any indication of the part of Abyssinia in which it was found. He referred it rather strangely to the Australian group Diphucephalides. His description of the connate ventral sternites shows that he was deceived by a superficial resemblance and it is almost certain that the insect is a species of *Apogonia* Kirby belonging to the section for which Kolbe (1899) proposed the subgeneric name *Catagonia*. The essential features of Brenske's genus are those of the males of the latter group of species and are absent in the females. Two species of the group were taken in Abyssinia by Raffray.—G. J. A.

OCHODÆINÆ.

Ochodæus ciliatus Benderitter, Ann. Soc. ent. Belg. lx. p. 113, 1920.

Loc. Abyssinia : Hawash railway station, ca. 3500 feet, 2. ix. 1926, 1 ex., at light (*Omer-Cooper*).

The specimen here recorded was determined by Mr. Arrow from description. The species was described from Eritrea.

ORPHNINÆ.

Orphnus galla Gestro, Ann. Mus. Civ. Genova, p. 328, 1895.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iv.–v. 1935, 19 ♂, 17 ♀ (*Uhlenhuth*) ; Hawash railway station, ca. 3500 feet, 2. ix. 1926, 1 ♀ at light (*Omer-Cooper*).

Orphnus galla was described from "Gallaland" (Southern Abyssinia). A male specimen from Somaliland, in the British Museum, agrees with the males from Dire Dawa and Hawash recorded above, both in its general form and the form of the ædeagus (I am indebted to Mr. E. B. Britton for making dissections and comparing the organs) ; the ædeagus is deeply cleft at the apex and the two lobes are pointed and curved over at the tip, while their outer margins slant obliquely and are then bent abruptly inwards, recalling the sides of the fluke of an anchor. The species is unknown outside this part of Africa.

The specimens from Dire Dawa were identified by Mr. Arrow as *O. galla* from the description of that species. M. Paulian, also working from the description only, concurs in this view *.

HYBOSORINÆ.

Hybosorus illigeri Reiche, 1853 ; Arrow, Coleopt. Cat., Pars 43, p. 36, 1912.

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* M. Paulian remarks that he knows no other described species to which they could be referred, though he recalls that Péringuey proposed (Trans. S. Afr. Phil. Soc. xii. p. 503, 1901) the name *Orphnus emeritus* for a species from the Galla country, closely allied to *O. zambesianus* Pér. *O. emeritus* was not, however, fully described, but was mentioned at the end of the remarks on *O. zambesianus*, and said to be pitchy-black and exhibiting certain differences from *O. zambesianus* in the form of the ædeagus. In the British Museum there is a male from Neghelli in the Boran country (Southern Abyssinia), determined by J. Müller as possibly *O. emeritus* ; it is larger than the males of *O. galla* and has the ædeagus slightly different.

Loc. Abyssinia : Hawash railway station. ca. 3500 feet, 2. ix. 1926, 1 ex., at light (*Omer-Cooper*) ; Dire Dawa, ca. 4500 feet, iii.–v. 1935, 24 ex. (*Uhlenhuth*).

This species is common and widely distributed over the whole of Africa, occurring also in Southern Europe and Asia Minor, extending to Persia and India. I can, however, find no definite information about its life-history. The question has recently been raised, because Mr. Omer-Cooper, now in charge of the Department of Zoology at Rhodes University College, Grahamstown, has recently sent me specimens collected at Messina in the Northern Transvaal, where the insect is suspected of damaging turf. Mr. Arrow, however, points out that some of the nearest allies of *Hybosorus* feed on decaying organic matter rather than on living plants We therefore await further information with interest. Sir Guy Marshall tells me that adult beetles of this species appear in numbers on the grassy veld in wet weather.

Phæochrous beccarii Harold, 1871 ; Arrow, Coleopt. Cat., Pars 43, p. 40, 1912.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii.–v. 1935, 18 ex. (*Uhlenhuth*).

Determined by Mr. Arrow, by comparison with a co-type. The species is recorded only from Abyssinia.

TROGINÆ

In this subfamily the abbreviation "Cat." refers to G. J. Arrow, Coleopterorum Catalogus, Pars 43, 1912.

Only one species was obtained by the Expedition, but four others, collected subsequently by Uhlenhuth, are recorded. The determinations are due to Mr. Arrow.

Trox montanus Kolbe, 1891 ; Cat. p. 58.

Loc. Abyssinia : between Jem-Jem Forest and Wouramboulchi, 8000–9000 feet, 30. ix.–11. x. 1926, 2 ex. (*Omer-Cooper*).

The species was originally described from "Masailand," and has not, as far as I know, been recorded from Abyssinia. The British Museum has specimens from Kilimanjaro, the Aberdares Mts., Mount Elgon, and other places in East Africa.

The species collected by Uhlenhuth at Dire Dawa, ca. 4500 feet, iii.–v. 1935, are :—

Trox incultus Fåhr. ; Cat. p. 57. 5 ex. South and East Africa (a form, regarded as a variety, from Madagascar).

Trox luridus F. ; Cat. p. 58. 2 ex. South and East Africa.

Trox niloticus Har. ; Cat. p. 58. 8 ex. Egypt ; the British Museum has specimens labelled "Abyssinia" and "East Africa."

Trox sp. A single example, rather worn. Considered by M. Paulian to be isolated, in relation to the several East African species with similar elytral sculpture, by the form of the terminal tooth on the anterior tibia ; M. Paulian thinks the species may be new, near *T. inclusus* Walker (*sensu* Boucomont & Paulian).

APHODIINÆ.

The determinations in this subfamily have been made, or at least confirmed, by M. R. Paulian. The abbreviation "Cat." refers to A. Schmidt, Aphodiinæ, Coleopterorum Catalogus, Pars 20, 1910. "Tierreich" refers to the same author's monograph, 'Aphodiinæ,' forming Lieferung 45 of 'Das Tierreich,' 1922. The species are not arranged below under subgenera, excepting the first, under which a new subspecies discovered by the expedition is listed ; the remainder are in alphabetical order of their specific names.

Aphodius (*Trichaphodius*) *corniculatus* Bouc., subsp. *scotti* Paulian, Bull. Soc. ent. France, xliv. p. 73, 1939.

Loc. Abyssinia : Jem-Jem Forest, and country beyond the Forest, and between it and Addis Ababa, ca. 8000 feet, ix.–x. 1926 ; Mt. Chillalo, ca. 10,000 feet, 17. xi. 1926 ; Mt. Chillalo, Digalla, ca. 9500 feet, 27. xi. 1926 ; 13 ex. in all (*Scott* and *Omer-Cooper*). At Jem-Jem Forest several specimens flew to candle-light or lamp-light in early October.

The typical form was based on specimens from Lake Albert and the Zambesi. The Abyssinian subspecies is distinguished by the reduction of the pubescence on the elytra, and by the fact that the sixth elytral stria is straight at the base, instead of being slightly elbowed as in the typical form. For these reasons, coupled with the great distance apart at which the typical form and the subspecies were found, M. Paulian decided to separate the latter.

Aphodius amœnus Boh.; Cat. p. 9; Tierreich, p. 129.

Loc. Abyssinia: marshes north of Lake Zwai, ca. 5000 feet, 4. xi. 1926, 1 ex. (*Omer-Cooper*); Dire Dawa, ca. 4500 feet, ii. 1935, 1 ex. (*Uhlenhuth*).

South Africa, Southern Rhodesia, Angola (the variety *pallidicornis* Walker occurs in the Oriental Region).

Aphodius ballioni A. Schmidt; Cat. p. 11; Tierreich, p. 24.

Loc. Abyssinia: Jem-Jem Forest, and Wourambouichi, beyond Jem-Jem, 8000–9000 feet, ix.-x. 1926, about 37 specimens (*Omer-Cooper*); Mt. Zukwala, ca. 9000 feet, 24–5. x. 1926, 2 ex. (*Omer-Cooper*); plain north-west of Lake Zwai, 5500–6000 feet, 31. x. 1926, 1 ex. (*Scott*); Mt. Chillalo, 9500–10,000 feet, xi. 1926, 2 ex. (*Scott*); Goulale, on the Akaki river (near Addis Ababa, ca. 8000 feet), x. 1904, 7 ex. (*P. C. Zaphiro*).

In addition to the above, one specimen from Wourambouichi and two from Mt. Chillalo are referred to var. *abessinicus* (Harold).

The typical form is recorded from Abyssinia and South Africa. The variety *abessinicus* was described, and subsequently catalogued (Cat. p. 7), as a distinct species; it is known only from Abyssinia.

Aphodius calcaratus Boh.; Cat. p. 15; Tierreich, p. 135.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix. 1926, 1 ex., at light (*Omer-Cooper*).

Described from South Africa, recorded also from Tanganyika (Usambara) and Abyssinia. The British Museum has a specimen from Belgian Congo, Ruanda (*L. Burgeon*).

Aphodius discolor Er.; Cat. p. 21; Tierreich, p. 66.

Loc. Abyssinia: Muger Valley, ca. 5500 feet, 28–29. xii. 1926, 1 ex. (*Scott*).

Originally described from West Africa (Senegal); recorded also from Togo, Portuguese Guinea, Kenya, and Abyssinia. The British Museum has a specimen labelled "Sennaar" (Sudan).

Aphodius doriæ Har.; Cat. p. 22; Tierreich, p. 17.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 feet, ix. 1926, 3 ex. (*Omer-Cooper*); Muger Valley, ca. 5500 feet, 28–29. xii. 1926, 1 ex. (*Scott*).

Recorded only from Abyssinia.

Aphodius gracilis Boh.; Cat. p. 28; Tierreich, p. 80.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, v. 1935, 1 ex. (*Uhlenhuth*).

South Africa, Egypt.

Aphodius humilis Roth; Cat. p. 31; Tierreich, p. 132.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix. 1926, 8 specimens flew to light (*Omer-Cooper*).

Previously recorded from Eritrea and Abyssinia, other parts of Tropical Africa, South Africa, and also India.

Aphodius impurus Roth; Cat. p. 32; Tierreich, p. 58.

Loc. Abyssinia: Muger Valley, ca. 5500 feet, 28–29. xii. 1926, 1 ex. (*Scott*).

Tropical and South Africa. The species was originally described from the province of Tigré, Northern Abyssinia.

Aphodius lacunosus A. Schmidt; Cat. p. 34; Tierreich, p. 61.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix. 1926, 1 ex., at light (*Omer-Cooper*).

The species was described from "Galla-land" (Central or Southern Abyssinia).

Aphodius lividus Ol.; Cat. p. 36; Tierreich, p. 316.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix., at light; Jem-Jem Forest, ca. 8000 feet, ix. 1926; Mt. Zukwala, ca. 9000 feet, x. 1926; Mt. Chillalo, ca. 10,000 feet, xi. 1926; Lake Hora Shala, ca. 5000 feet, xi. 1926; Muger Valley, ca. 5500 feet, xii. 1926; about 21 ex. (*Scott* and *Omer-Cooper*).

The distribution of this cosmopolitan species seemed fairly general. It ranged in altitude from 3500 to 10,000 feet, but the greater number of our specimens were collected at the lower elevations.

Aphodius mœstus F.; Cat. p. 41; Tierreich, p. 151.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, ii. 1935, 1 ex. (*Uhlenhuth*).

Oriental Region, parts of Tropical and South Africa, Madagascar.

Aphodius rugulicollis Fairmaire ; Cat. p. 54 ; Tierreich, p. 154.

Loc. Abyssinia : Hawash railway station, 3500 feet, 2. ix. 1926, 1 ex., at light ; Jem-Jem Forest, and country between it and Addis Alam, ca. 8000 feet, ix. 1926, 4 ex. (all *Omer-Cooper*).

Described from Abyssinia (Shoa). Recently collected in South-Eastern Kenya (Chyulu Hills, 5600 feet, 1938).

Aphodius sorex F. ; Cat. p. 58 ; Tierreich, p. 27.

Loc. Abyssinia : Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 30. ix–1. x. 1926, 3 ex. (*Omer-Cooper*) ; Mt. Chillálo, 8000 feet, 6–8. xi, and from Digalla (on the southern spurs of the mountain), 9500 feet, 27. xi. 1926, 3 ex. (*Scott*) ; Goulale, on the Akaki River (near Addis Ababa), x. 1904, 1 ex. (*P. C. Zaphiro*).

Var. *caffer* Wied. The seven specimens recorded above are of the typical form, with rufous elytra. There are, besides, three specimens of the black variety, *caffer*, from the same places as the typical examples (*i. e.*, one from Wouramboulchi and two from Digalla, Mt. Chillálo). The British Museum has one specimen of this variety from Managasha, west of Addis Ababa, x. 1904 (*P. C. Zaphiro*).

This species is very widespread, its distribution including large parts of the Oriental Region, Australia, Abyssinia, and South Africa ; while the variety *caffer* is recorded from Abyssinia (Shoa) and Southern Africa.

Aphodius strigilatus Roth ; Cat. p. 59 ; Tierreich, p. 301.

Loc. Abyssinia : Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 30. ix.–1. x. 1926, 1 ex. (*Omer-Cooper*) ; Mt. Zukwala, ca. 9000 feet, 24–25. x. 1926, 4 ex. (*Omer-Cooper*) ; marsh north of Lake Zwai, ca. 5500 feet, 1. xi. 1926, 1 ex. (*Omer-Cooper*) ; Mt. Chillálo, ca. 10,000 feet, 17. xi. 1926, 26 ex. from excreta of cattle and horses (*Scott*) ; Mt. Chillálo, Digalla, ca. 9000 feet, 27. xi. 1926, 11 ex. (*Scott*) ; Goulale, on the Akaki River (near Addis Ababa), x. 1904, 1 ex. (*P. C. Zaphiro*).

The previously recorded distribution was Abyssinia (Tigré, Shoa, etc.) and South Africa.

The specimens recorded in detail above, all of which were determined by M. Paulian, display considerable variation in colour and form. Some are longer and have the elytra mainly rufous, though darkened along the suture and striæ; such are all those from Mt. Zukwala, and from Digalla, on the southern spurs of Mt.Chillálo. On the other hand, nearly all those found on another part of Mt. Chillálo, at 10,000 feet, are shorter and broader, with the elytra mostly pitchy-blackish except at the posterior declivities. M. Paulian tells me (*in litt.*) that *A. strigilatus* is a very protean species, but that it always has the elytral striæ, at least, darkened, and two small teeth on the longitudinal carina of the front tibiæ, respectively at about the middle and near the apex. Two specimens, with elytra rather clear rufous but darker along the suture, have been separated by M. Paulian from the rest of those from Mt. Chillálo (10,000 feet) as either a particular variety of *A. strigilatus*, or possibly rather small and feebly punctured examples of *A. lætus* Wied., this question cannot be settled now.

Aphodius tetricus Harold; Cat. p. 62; Tierreich, p. 313.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 feet, ix. 1926, 9 ex. (*Omer-Cooper*).

Only recorded hitherto from Abyssinia. The British Museum has a specimen from Northern Kenya: Lake Rudolf, Dome Rock, 20. v. 1934 (*Rift Valley Expedition*; R. Paulian det.).

Atænius gracilis (Melsh.); Cat. p. 74; Tierreich, p. 436.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 feet, from river-bed, 2. x. 1926, 1 ex. (*Scott*).

Described from Pennsylvania, later recorded from the West Indies, South America, and the Congo. In the British Museum are specimens from Uganda, Southern Rhodesia, and Natal. Probably the species is distributed through most of the warmer parts of the world.

Saprosites sp.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 feet, from decayed parts of a tree-Euphorbia (*E. abyssinica*), 26. ix. 1926, 1 ex. (*Scott*); same locality, x. 1926, 1 ex. (*Omer-Cooper*).

These specimens were doubtfully referred by M. Paulian to *S. cavus* A. Schmidt (Cat. p. 79; Tierreich, p. 403), a species recorded from the Congo and Zanzibar. They do not, however, agree with an example from the Congo in the British Museum, received in 1935 from the Congo Museum at Tervueren under the name *S. cavus*. The Abyssinian specimens are much larger, darker in colour, and exhibit differences in form and punctation. If, therefore, the Congo specimen is rightly named, the Abyssinian specimens must belong to another species, possibly undescribed.

Rhyssemus granosus Klug; Cat. p. 87; Tierreich, p. 505.

Loc. Abyssinia: Hawash railway station, ca. 3500 feet, 2. ix. 1926, at light, 6 ex. (*Omer-Cooper*); west side of Lake Zwai, ca. 5500 feet, xi. 1926, 2 ex. (*Omer-Cooper*); Muger Valley, ca. 5500 feet, xii. 1926, 2 ex. (*Scott*); Dire Dawa, ca. 4500 feet, ii. 1935, 2 ex. (*Uhlenhuth*).

Originally described from West Africa, this species has been recorded also from Abyssinia, India, and the Cape Verde Is. The British Museum has specimens from Arabia determined by A. Schmidt, and others from Kenya determined by R. Paulian. Indeed, M. Paulian, to whom I submitted several of the Abyssinian specimens recorded above, writes that they are identical with specimens from Kenya, except that the latter have a slightly broader body. On the other hand (he writes), the Abyssinian specimens are more slender, and have broader and higher thoracic elevations than in examples from the Senegal or the Congo.

COPRINÆ.

In this subfamily "Cat." refers to J. J. E. Gillet, Coprinæ I, Coleopterorum Catalogus, Pars 35, 1911; and A. Boucomont and J. J. E. Gillet, Coprinæ II, *op. cit.* Pars 90, 1927. The determinations are mainly due to M. Paulian, in some cases to Mr. Arrow.

Scarabæus ægyptiorum Latr.; Cat. p. 8.

Loc. Abyssinia: between Lake Zwai and the Makki River, 5500–6000 feet, xi. 1926, 1 ex. (*Omer-Cooper*); Dire Dawa, ca. 4500 feet, iv. 1935, 3 ex. (*Uhlenhuth*).

Upper Egypt, Abyssinia, Somaliland. The British Museum has specimens from Kenya, Baringo, ca. 4000 feet.

Scarabæus lævistriatus Fairm. ; Cat. p. 11.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iv. 1935, 2 ex. (*Uhlenhuth*).

Described from Somaliland, and later recorded under the name *S. bettoni* Waterhouse from " British East Africa " (Maziwa Mitatu).

Sisyphus spinipes Thunb. ; Cat. p. 24.

Loc. Abyssinia : Jem-Jem Forest, 8000–9000 feet, ix. 1926, 2 ex. (*Scott*) ; Mt. Zukwala, ca. 9000 feet, x. 1926, 1 ex. (*Omer-Cooper*) ; Mt. Chillálo, ca. 8000 feet, xi. 1926, 1 ex. (*Scott*) ; Muger Valley, 5500 feet, xii. 1926, 10 ex. (*Scott*).

The species is recorded from South Africa, Rhodesia, and Mozambique. The British Museum has a long series under this name, including specimens from Tanganyika, Kenya, Uganda, West Africa (Senegal and Nigeria), and some old specimens from Abyssinia.

Among the specimens collected in Abyssinia in 1926, the four from the high altitudes (8000–9000 feet) are much larger than those from the Muger Valley (5500 feet). One of the large specimens, submitted to M. Paulian in 1938, was determined by him as *S. calcaratus* Klug ; but the specimens under this name in the British Museum have a much sharper spine on the underside of the hind femur in the male. I cannot venture an opinion whether *S. spinipes* and *S. calcaratus* are really distinct, but I agree with Mr. Arrow that all the Abyssinian specimens should be left, for the present at least, under the name *S. spinipes*.

Heliocopris beccarii Harold ; Cat. p. 64.

Loc. Abyssinia : Jem-Jem Forest, ca. 8000 feet, 6. x. 1926, 1 ex., at light (*Scott*) ; Dire Dawa, ca. 4500 feet, iv. 1935, 1 ex. (*Uhlenhuth*).

Recorded in the Catalogue from Eritrea. The British Museum has a specimen from Tanganyika and one from the Transvaal.

Catharsius furcillatus Guérin ; Cat. p. 68.

Loc. Abyssinia ; south-east of Lake Zwai, ca. 5500 feet, xi. 1926, 1 ♀ (*Omer-Cooper*) ; Lake Haramaiya, 6600 feet, iv. 1935, 1 ex. (♂ ?) (*Uhlenhuth*).

Recorded from Abyssinia. The British Museum has specimens from Angola, Uganda, Eritrea, and Abyssinia ; only one of the latter has detailed data : Kaffa Province [South-Western Abyssinia], Gojeb River, 2500 feet, 26. v. 1905 (*P. C. Zaphiro*).

Catharsius minutus Lansb. ; Cat. p. 68.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii. 1935, 2 ex. (*Uhlenhuth*).

Determined by M. Paulian, by comparison with the type. The species was described from Somaliland.

Catharsius platycerus Klug ; Cat. p. 70.

Loc. Abyssinia : between Jem-Jem Forest and Wouramboulchi, 8000–9000 feet, 30. ix.–1. x. 1926, 1 ♂ (*Omer-Cooper*) ; Doukam, 6500–7000 feet, 19. x. 1926, 1 ♂ (*Scott*).

Described from South Africa, recorded also from Abyssinia and East Africa. The specimens in the British Museum are labelled " Somali " and "Abyssinia," mostly without further details, though two of the latter are labelled, respectively, from the Entoto Mts., north of Addis Ababa, x. 1904 (*P. C. Zaphiro*), and the Abbai River [Blue Nile], vi. 1902 (*Degen*).

Catharsius sesostris Waterhouse ; Cat. p. 70.

Loc. Abyssinia : Jem-Jem Forest, 8000–9000 feet, 29. ix.–7. x. 1926, 1 ♂, 1 ♀ (*Scott*) ; Dire Dawa, 4500 feet, iv.–v. 1935, 3 ♂ (*Uhlenhuth*) ; Lake Haramaiya, 6600 feet, iv. 1935, 2 ♀ (*Uhlenhuth*).

The distribution is given in the Catalogue as Africa and Syria. The British Museum has a long series, from Egypt, Sudan, Gambia, Tanganyika, Southern Rhodesia, and Natal.

Copris elphenor Klug ; Cat. p. 73.

Loc. Abyssinia : between the Hawash River and Addas, 6000–7000 feet, 28–30. xi. 1926, 1 ♀ (*Omer-Cooper*).

Recorded from East, South-East, and South Africa. I know no other records from Abyssinia.

Copris evanidus Klug ; Cat. p. 74.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii.–v. 1935, 3 ♂, 2 ♀ (*Uhlenhuth*).

East, South-East, and South Africa. The series in the British Museum includes two old specimens labelled "Abyssinia," without more precise data.

Copris orphanus Guérin ; Cat. p. 77.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii.–v. 1935, 7 ♂, 1 ♀ (*Uhlenhuth*).

The distribution given in the Catalogue is East Africa and Abyssinia. The British Museum has specimens from Kenya, Kilimanjaro, Uganda, Angola, North-Western and Southern Rhodesia, as well as two old specimens labelled "Abyssinia" without further details.

Onitis alexis Klug ; Cat. p. 93 ; Janssens, Rev. Onitides (Mém. Mus. Hist. Nat. Bruxelles, ser. 2, fascic. 11), p. 59, 1937.

Loc. Abyssinia : Muger Valley, ca. 5500 feet, 28–29. xii. 1926, 23 ex. (*Scott*).

Janssens (*loc. cit.*) gives the distribution as "all Africa, exceptionally also in Southern Spain." The British Museum series includes specimens from three very widely distant parts of Southern Arabia, namely, Lahej, the Hadhramaut, and the Qara Mts.

Onitis consanguineus Felsche ; Cat. p. 94 ; Janssens, *op. cit.* p. 66.

Onitis decellei Paulian, Bull. Soc. ent. France, xxxviii. p. 12, 1933.

Loc. Abyssinia : Muger Valley, ca. 5500 feet, xii. 1926, 6 ex. (*Scott.*).

Abyssinia, Kenya, Belgian Congo.

The specimens from the Muger Valley were determined by M. Paulian as *O. decellei*, which Janssens regards as a strongly punctured form of *O. consanguineus*, though M. Paulian himself still reserves an opinion as to whether the two may be distinct.

Onitis politus Lansberge ; Cat. p. 97 ; Janssens, *op. cit.* p. 54.

Loc. Abyssinia : Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 30. ix.–1. x. 1926, 6 ex. (*Omer-Cooper*) ; Managasha, ca. 8000 feet, 26. x. 1904, 5 ex. (*P. C. Zaphiro*).

Only recorded from Abyssinia. The British Museum has, besides the specimens collected by the late P. C. Zaphiro, mentioned above, several older ones labelled "Abyssinia" with no further details. So far as our information goes, therefore, this species occurs at higher altitudes than those found in such numbers in the Muger Valley.

Onitis uncinatus Klug; Cat. p. 98; Janssens, *op. cit.* p. 112.

Loc. Abyssinia: Dire Dawa, ca. 4500 feet, v. 1935, 1 ex. (*Uhlenhuth*).

Previously recorded from Abyssinia, and various parts of Central, East, South-East, and South Africa.

Onitis vicinus Lansb.; Cat. p. 98; Janssens, *op. cit.* p. 63.

Loc. Abyssinia: Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 30. ix.–1. x. 1926, 2 ex. (*Omer-Cooper*); Mt. Chillálo, ca. 9500 feet, 27. xi. 1926, 1 ex. (*Scott*); Managasha, ca. 8000 feet, 26. x. 1904, 1 ex. (*P. C. Zaphiro*).

This species also evidently frequents high altitudes. According to Janssens (*l. c.*) it is only known from Abyssinia, and the records from Southern Africa were based on erroneous determinations.

Onitis viridulus Boh.; Cat. p. 98; Janssens, *op. cit.* p. 65.

Loc. Abyssinia: Muger Valley, ca. 5500 feet, 28–29. xii. 1926, about 203 ex. (*Scott*).

This species was found in far greater numbers than either of the other species of *Onitis* (*O. alexis*, *O. consanguineus*) taken at the same place and time. It has been recorded previously from Abyssinia, Belgian Congo, East and South Africa. The British Museum has specimens under this name from Uganda, as well as an example from Egypt, and one from Abyssinia taken at Zegi, on the southern shore of Lake Tana [Tsana], v.–vi. 1902 (*Degen*).

Oniticellus inæqualis Reiche; Cat. p. 106.

Loc. Abyssinia: Mt. Zukwala, ca. 9000 feet, 24–25. x. 1926, 6 ex. (*Omer-Cooper*).

The distribution recorded in the Catalogue is "East Africa." The British Museum has specimens from

Eritrea and Abyssinia, several parts of Kenya, and Tanganyika (Usambara).

Oniticellus mobilicornis Bouc.; Cat. p. 107.

Loc. Abyssinia: Mt. Chillálo, ca. 10,000 feet, from moorland of short turf dotted with bush-heath (*Erica arborea*), 17 and 22. xi. 1926, 2 specimens, one of which was found in excreta of cattle or horses (*Scott*).

I know no record from outside Abyssinia.

Oniticellus nasicornis Reiche; Cat. p. 107.

Loc. Abyssinia: Mt. Zukwala, ca. 9000 feet, 24–25. x. 1926, 2 ex. (*Omer-Cooper*); Mt. Chillálo, ca. 8000 feet, 6–8. xi. 1926, 1 ex. (*Scott*); Muger Valley, ca. 5500 feet, 28–29. xii. 1926, 25 ex. (*Scott*).

Distribution: the Catalogue gives "Africa"; the British Museum has specimens from Eritrea and Abyssinia, without detailed records of locality.

Oniticellus (*Liatongus*) *raffrayi* Lansb.; Cat. p. 108.

Loc. Abyssinia: Wouramboulchi, beyond Jem-Jem Forest, ca. 9000 feet, 30. ix.–7. x. 1926, 11 ex. (*Omer-Cooper*); Mt. Zukwala, ca. 9000 feet, 24–25. x. 1926, 3 ex. (*Omer-Cooper*); Managasha, ca. 8000 feet, 26. x. 1904, 11 ex., and Goulale, on the Akaki River, 24. x. 1904, 2 ex. (*P. C. Zaphiro*).

I know no published record from outside Abyssinia. In the British Museum, however, there are two specimens labelled Kidugala, Uheheland [Tanganyika].

Onthophagus blanchardi Har.; Cat. p. 159.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 feet, ix. 1926 (*Scott* and *Omer-Cooper*); Wouramboulchi, ca. 9000 feet, ix.–x. 1926 (*Omer-Cooper*); Mt. Zukwala, ca. 9000 feet, x. 1926 (*Omer-Cooper*); Mt. Chillálo, from forest ca. 9000 feet, and from Digalla, ca. 9500 feet, xi. 1926 (*Scott*); 61 specimens in all (of which 31 are males, exhibiting various degrees of development of the prothoracic horn); 50 of the specimens were collected at Wouramboulchi. The British Museum also has specimens from Managasha, and Goulale, Akaki River (both near Addis Ababa), collected x. 1904 (*P. C. Zaphiro*).

This handsome, metallic greenish-bronze species is the only one of the genus obtained in numbers. Its recorded distribution is Abyssinia, Egypt, and the Sudan. The British Museum has a specimen found at 6200 feet in Kenya.

Onthophagus flavibasis d'Orb. ; Cat. p. 168.

Loc. Abyssinia : Mt. Chillálo, Digalla, ca. 9500 feet, 27. xi. 1926, 2 ex. (*Scott*).

Recorded only from Abyssinia. No specimens previously in the British Museum.

Onthophagus kachowskyi d'Olsouf. ; Cat. p. 176.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, v. 1935, 1 ♂ (*Uhlenhuth*).

Recorded originally from Somaliland, as occurring in great numbers in the excreta of mules. The British Museum has a number of specimens labelled simply "Abyssinia."

Onthophagus laceratus Gerst. ; Cat. p. 177.

Loc. Abyssinia: between lakes Hora Abjata and Hora Shala, ca. 5000 feet, 19–21. xi. 1926, 1 ex. (♀ ?) (*Omer-Cooper*).

East Africa and French Congo. The British Museum has specimens from Zanzibar and Tanga, and other older ones labelled simply " East Africa."

Onthophagus lituratus Roth, var. *lugubris* Roth ; Cat. p. 179.

Loc. Abyssinia : Dire Dawa, ca. 4500 feet, iii. 1935, 1 ♂ (*Uhlenhuth*).

O. lugubris Roth is regarded by d'Orbigny as a dark variety of *O. literatus* Roth (d'Orbigny, 'Memoire sur les Onthophagides d'Afrique,' Ann. Soc. ent. France, lxxi. p. 176, 1902). This view is adopted in the Catalogue and by M. Paulian, while Mr. Arrow, after re-examining specimens of both forms, agrees.

The species is recorded from Abyssinia and Eritrea. In the British Museum both the typical form and the variety are represented by old specimens labelled simply " Abyssinia."

Two other species of the genus *Onthophagus*, represented by single specimens, cannot, unfortunately, be named: (i) a very small specimen from the Muger Valley, ca. 5500 feet, xii. 1926 (*Scott*), referred by M. Paulian to the 3rd Group of d'Orbigny, and (ii) a defective specimen which flew to light at the Hawash railway station, 3500 feet, 2. ix. 1926 (*Omer-Cooper*).

II.—*Entomological Expedition to Abyssinia*, 1926–7. *Coleoptera*, Corylophidæ. (*Contribution to the Study of the* Corylophidæ, I.). By RENAUD PAULIAN (Laboratoire d'Entomologie, Muséum d'Histoire Naturelle de Paris).

DR. HUGH SCOTT has most kindly sent me for study the Corylophid beetles collected in Abyssinia by himself and Mr. J. Omer-Cooper during the 1926–7 Expedition. The African members of this family are very badly known, as only thirteen species seem to be described from that part of the world. But, on the other hand, it seems that the group as a whole is well distributed throughout the world, and, wherever Corylophidæ are systematically collected, great numbers of new forms are discovered. In the Seychelles, during the Percy Sladen Trust Expedition of 1908–9, Dr. Scott collected no less than twelve species. In material from Madagascar, collected by Dr. Sicard and actually in the Paris Museum, I have found lately thirteen species, of which ten were new. Lastly, during a recent expedition to the southern part of Cameroon I have had the opportunity of collecting a number of species which were previously unknown. So it is not surprising to find that in Abyssinia the whole of the five species, represented by the twenty-two specimens collected, are undescribed forms.

I hope soon to be able, thanks to the ample material in the Paris Museum, the British Museum, and the Musée du Congo at Tervueren (Belgium), to gve a general monograph of the African members of the family Corylophidæ, but, in view of the delay involved in the achievement of such a study, I thought it advisable to give a preliminary report on those species collected by Dr. Scott and Mr. Omer-Cooper. It is naturally much too early to discuss the characteristics of the Abyssinian fauna, as it includes certainly many more species than were collected. Nevertheless it may be of interest to note that all the species found in the Abyssinian highlands belong to widely spread, and mostly palæarctic, genera. Contrary to what is known of the fauna of Madagascar, the tropical oriental genera, such as *Lewisium* or *Meioderus*, have not been found in Abyssinia.

It appears also, in view of the very rich fauna of the Seychelles, Madagascar, Ceylon, Japan, or Tonkin, that the continental African fauna is not very rich.

Lastly, the general *size* of the species collected is feeble, and no giant forms, such as I know from Mt. Elgon or from Pondoland, have been observed. In fact the size appears not much above that of the Seychelles species, considered by Dr. Scott as smaller than normal.

While describing the species I should like to call attention to the fact that it is necessary, in order to classify the species satisfactorily in their genera, to dissect and to give figures of the mouth-parts and, when possible, of the genitalia. The actual state of the greater number of genera, though Matthews's splendid work did much towards making it clear, is still in the greatest disorder, and much further investigation will be necessary before we get a satisfactory picture of the taxonomy of the family.

The *wings* have been investigated in all the species described here, and have always been found to be ample.

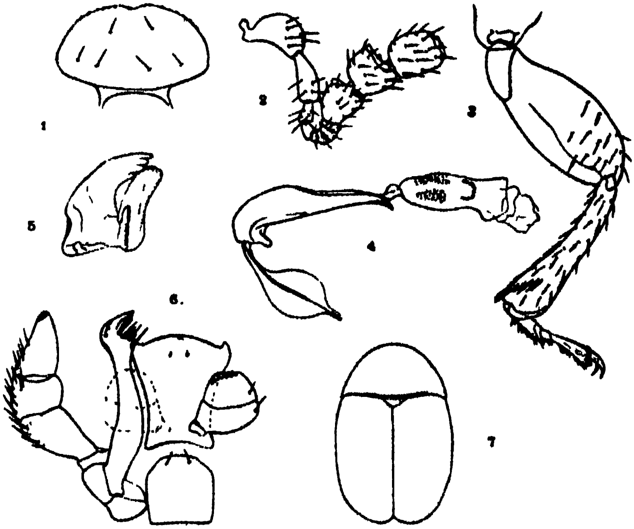
The *type-specimens* are in the British Museum.

SACIUM Leconte.

Sacium abyssinicum, sp. n. (Figs. 1–7.)

Length: 1·3–1·4 mm. Body rather short and broad, convex, shining; piceous-black, apical and lateral margins of the elytra paler, anterior part of the prothorax widely pellucid, the remaining part of the thorax red; antennæ and legs red; the whole upper surface covered with very minute, sparse, short, yellow, obliquely raised setæ.

Prothorax semicircular, rather long, as wide at base as the elytra at their base, with posterior angles acute, produced hindwards; distinctly declivous in front, with lateral margins thick and well marked all round; base distinctly bisinuate; quite close to the base, and parallel to it, is a narrow, transverse, depressed line, with a series of distinct punctures; the whole upper surface covered with a rather strong and not close punctation, surface nearly smooth between the punctures. *Scutellum* broadly triangular, very finely and sparsely punctured. *Elytra* ovate and broad, broadly truncate apically, regularly curved at the sides, with their greatest width about the middle, and a slight longitudinal impression beneath each shoulder; lateral border distinct from above in the first two-thirds, nearly complete, rather thick. Sutural stria very distinct, reaching nearly to the middle of the elytra. Punctation rather strong and not close, sparser and finer in the middle of the base and a short way along the suture. *Antennæ* 11-jointed. *Mentum* wide and short, with front angles truncate. *Labrum* distinctly emarginate in the middle. *Prosternum* narrow, only very feebly produced in front in the middle. *Metasternum*



Sacium abyssinicum, ♂.

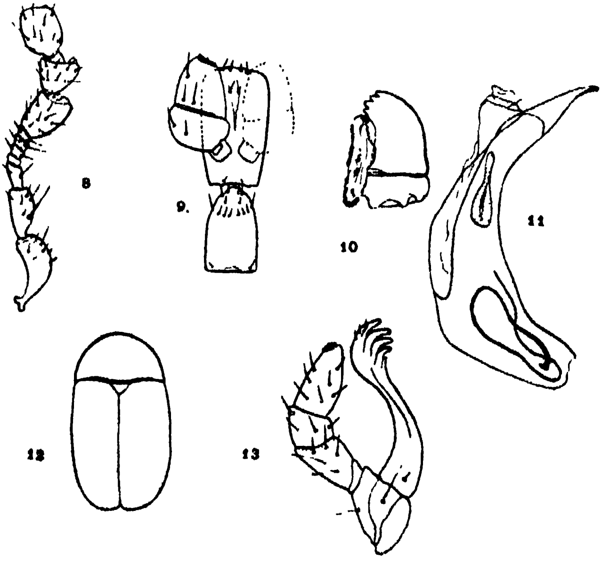
1, labrum; 2, antenna; 3, anterior leg; 4, penis; 5, mandible; 6, maxilla and labium; 7, outline of body.

rather strongly and not closely punctured. *Abdomen* finely and closely punctured.

Male genital armature with penis long and rather slender, its apex shortly curved; internal sac with three distinct masses of very fine scales. *Anterior tibiæ* unmodified in the male.

Loc. Abyssinia: Jem-Jem Forest, 8000 feet, 7. ix. 1926, from decaying wood, 5 ex. (*Scott*).

A number of species of *Sacium* have been described by Reitter from East Africa, but, as far as may be judged from his descriptions, *S. abyssinicum* appears to differ from these species.



Arthrolips podocarpi, ♂.
8, antenna; 9, labium; 10, mandible; 11, penis; 12, outline of body; 13, maxilla.

ARTHROLIPS Wollaston.

Arthrolips podocarpi, sp. n. (Figs. 8–13.)

Length: 1·35 mm. Body elongate, ovate, convex, slightly shining, covered with close and long yellow setæ; dark brown, the margins paler; legs and antennæ pale. Some specimens are much paler, either wholly or only on the apical part of the elytra.

Prothorax rather long, regularly rounded at the sides, with posterior angles not produced, straight, base nearly straight, lateral margins and transverse basilar impression well marked; punctation regular, rather strong and very close, surface slightly rugose between the punctures. *Scutellum* short and broad, triangular. *Elytra* long, nearly parallel, only slightly narrowed behind and abruptly rounded, subtruncate at the apex; lateral margins not visible from above, even near the shoulder, but reaching nearly to the apex and well marked. Sutural stria not very distinct from the general punctation but long. Punctation very close and rather strong, even closer in the apical part of the elytra. *Mentum* long and narrow, tapering anteriorly.

Male genital armature: penis rather long and slender, arcuate, tapering and curved at tip; internal sac with a long, slender, chitinous flagellum and with a small, slightly clavate, copulatory plate.

Loc. Abyssinia: Jem-Jem Forest, 8000 feet, 22. ix. 1926, from under the bark of *Podocarpus*-tree, 9 ex. (*Scott*).

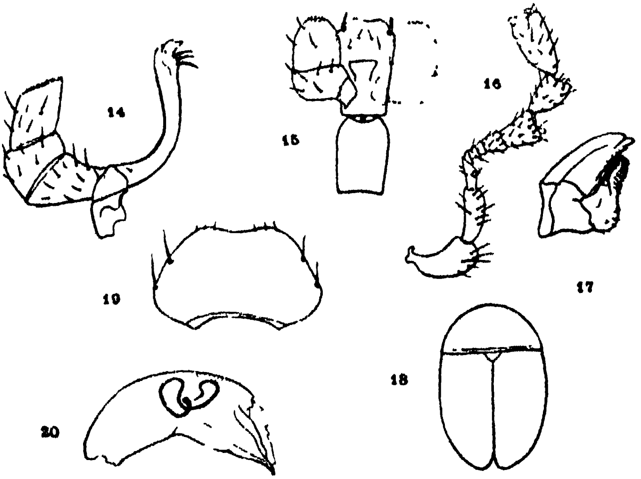
Arthrolips omer-cooperi, sp. n. (Figs. 14–20.)

Body ovate, rather broad and convex, brown; prothorax and apical region of the elytra reddish, front part of the prothorax nearly pellucid. All the body covered with long and close yellow setæ. Legs and antennæ yellow. *Prothorax* broad, circular, with sides regularly curved and rather strongly margined; posterior angles slightly produced and acute; base nearly straight, very slightly impressed transversely. Punctation close and rather strong, regular; punctures round, closer near the base. *Scutellum* short, rounded, punctured. *Elytra* ovate, very slightly broader at the shoulders than the prothorax at its base; their greatest width at the anterior third. Sutural stria distinct but slight, on the two posterior thirds of the elytra. At the sides the border reaches nearly to the apical part. Apex broadly rounded, not truncate. Punctation regular, rather strong and very close; surface not rugose between the punctures. *Mentum* long, rather narrow, the anterior angles slightly produced. *Labrum* distinctly emarginate. *Prosternum* very narrow and not produced in the middle in front. *Metasternum* and *abdomen* rather slightly and not closely punctured.

Male genital armature: penis very short and broad, apex slender and curved; internal sac without any copulatory plate, but with a long, slender, chitinous flagellum. *Anterior tibiæ* not modified in male.

Loc. Abyssinia: Mt. Chillalo, forest, circa 9000 feet, 12. xi. 1926, 1 ex. (*Scott*); marshes of Lake Hora Abjata, 18. xi. 1926, 1 ex. (*Omer-Cooper*).

The two specimens, which were found by dissection to be identical, differ by their colour. The specimen from Chillalo is much darker than the type from Hora Abjata, but otherwise, even exteriorly, the two specimens agree so closely that it is not possible to separate them.



Arthrolips omer-cooperi, ♂.

14, maxilla; 15, labium; 16, antenna; 17, mandible; 18, outline of body; 19, labrum; 20, penis.

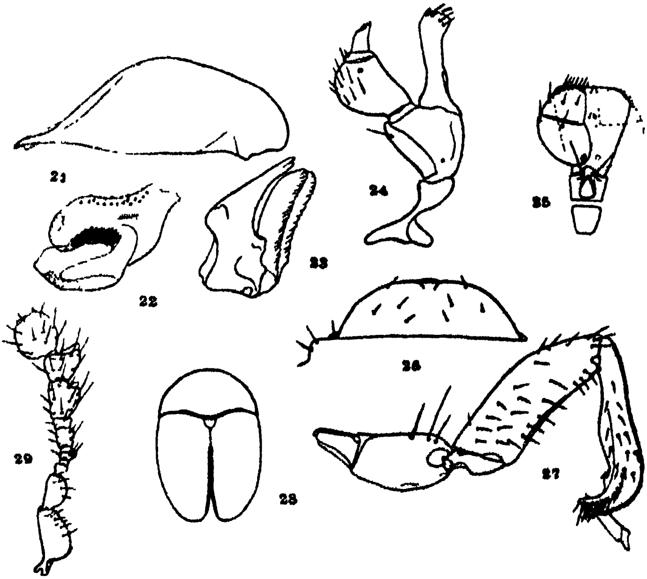
The four African species of *Arthrolips* previously known differ, at first sight, by their colour-pattern from the two species described here. *A. podocarpi* and *A. omer-cooperi* differ from one another by the general shape, by the shape of the mentum, of the antennal club, and of the penis. These last differences are so strong as to suggest that it will probably be necessary to divide the genus *Arthrolips* into a number of subgenera.

MICROSTAGETUS Wollaston.

Microstagetus dubius, sp. n. (Figs. 21–29.)

Length: 1 mm. Body short, broad, rather convex, reddish-brown, clearer on the anterior margins, covered with yellow, rather long, and closely set setæ. Legs yellow.

Prothorax very wide and short, regularly rounded along the front margin; posterior angles well produced, rather slender but slightly obtuse at apex; base feebly bisinuate, with a well-marked transverse impression and a rather strong and close, regular punctation; punctures round. *Scutellum* short, broad and round, punctured. *Elytra* slightly narrower at base than prothorax at its base; greatest width of elytra at anterior third; elytra regularly ovate, not truncate but rounded at apex; sutural stria very long, but slender and quite close to the suture; punctation strong and close, slightly closer



Microstagetus dubius, ♂.

21, penis; 22, copulatory plate; 23, mandible; 24, maxilla; 25, labium; 26, labrum; 27, anterior leg; 28, outline of body; 29, antenna.

near the apex; lateral borders well marked near the shoulder, thinning out posteriorly, and disappearing well before the apex. *Antennæ* 11-jointed. For the *mouth-parts*, cf. figs. 23–26, 29. *Anterior tibiæ* of males strongly curved and acuminate at the apex, with a series of strong spines near the apex.

Male genital armature with penis strong, straight, slender and curved at the apex; internal sac with a double copulatory plate, one part covered on its dorsal margin with long setæ and the ventral margin with feeble parallel ridges; the other part with a few rows of obtuse tubercles on the dorsal margin.

Loc. Abyssinia: Jem Jem Forest, 8000–9000 feet, 1–7. x. 1926, beaten from grass thatch of hayricks, and found under the bark of decaying Mimosas, 3 ex. (*Scott*).

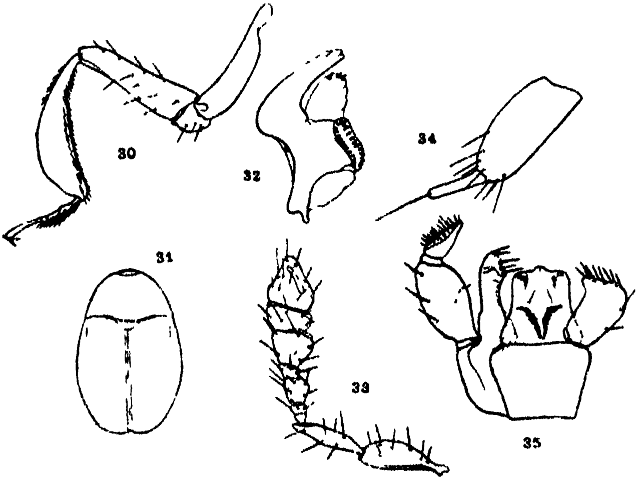
The only known species of *Microstagetus* was described from Madeira. Judging by Matthews's drawings, *M. dubius* might well be congeneric with *M. parvulus* Woll., but it differs in many aspects from that species. The most important of these differences lie in the shape of the mandibles, which in *M. dubius* are long, slender, bidentate at apex, with a strong hyaline molar process, as long as the mandible and covered with feeble ridges. It seems of doubtful usefulness to create a new genus for an exotic species while the knowledge of such forms is as imperfect as it is, and I think it best to range *M. dubius* provisionally in the genus *Microstagetus*. The discrepancy in geographic distribution is only of slight importance, as the African fauna is practically unknown. At all events, by the structure of the anterior legs, with long coxæ and very long, cylindrical, tapering femora (as against broad and oval femora in the Saciinæ), and by the modification of the anterior tibiæ in the male, as well as by the structure of the maxillary palpus, this species belongs to the Corylophini, and the only known Corylophine genus with 11-jointed antennæ and setigerous upper surface is the genus *Microstagetus* Woll.

ORTHOPERUS Stephens.

Orthoperus scotti, sp. n. (Figs. 30–35.)

Length: 1·15–1·20 mm. Body very convex, oval, pitchy-brown, with apical margins of the elytra and, narrowly, the posterior half of the suture, red ; shining and glabrous. Legs more or less rufous. Antennæ yellow, with the club darker.

Head minutely and rather sparsely punctured. *Prothorax* broad, very convex, with sides regularly curved from the hind angles, which are acute and very slightly produced, to the anterior angles, which are completely rounded ; sides nearly straight in the posterior part ; base bisinuate, with a strong transverse impression inside the base ; lateral margins not very strong ; punctation irregular, rather fine and close, surface nearly smooth between the punctures, which are frequently elongate. *Scutellum* very broad and short, sparsely and finely punctured. *Elytra* ovate, slightly wider than prothorax at the base ; lateral border slender, nearly whole, but completely invisible from above ; a slight impression beneath each shoulder ; sutural stria whole, distinct, but quite close to the suture ; punctation irregular, elongate, rather close and fine in the anterior half, much sparser and rather finer in the posterior half ;



Orthoperus scotti, ♀.

30, anterior leg ; 31, outline of body ; 32, mandible ; 33, antenna ; 34, ♀ genital style ; 35, maxilla and labium.

surface very finely rugose between the punctures. *Prosternum* very broad, straight in front, with two strong setæ on the anterior margin. *Metasternum* and *abdomen* sparsely and not strongly punctured.

Loc. Abyssinia: Mt. Zukwala, summit, circa 9665 feet, 23. x. 1926; Jem-Jem Forest, 9000 feet, 14. ix. 1926; 3 ex. (*Scott*).

This species is the third of the genus known from Africa; it differs widely from *O. eichelbaumi* Reitter by its much larger size and different *habitus*. It seems closer to *O. ruwenzoriensis* Scott, but can be distinguished at sight from that species by the closer and stronger punctation and by the nearly smooth surface of the thorax between the punctures. I have seen a fourth African species, also from East Africa, collected by MM. Alluaud and Jeannel on Mt. Kenya, in the Alpine zone, in *Senecio keniodendron*, and differing from *O. ruwenzoriensis* by the much closer punctation and rugosities of the elytra.

III.—*Preliminary Descriptions of Twenty-one new Species of Pelagic Penæidea (Crustacea Decapoda) from the Danish Oceanographical Expeditions* [*]. By MARTIN D. BURKENROAD, Bingham Oceanographic Laboratory, Yale University.

THE completion of systematic, developmental and distributional study of the immense quantity of Peneid and Sergestid material contained in the 'Dana' Collections must necessarily take some time. It therefore seems desirable that as the sorting of the material progresses, preliminary notice of new species encountered should be published; especially since the proportion of unnamed forms is greater than even such extensive collections might have been expected to include in view of the wide distribution of many pelagic species of the tribe and the considerable attention which they have previously received.

It is with warmth that I express my thanks to Dr. Å. V. Tåning and to Mr. K. Stephensen for opportunity to study the Danish collections, and to the Rask-Ørsted Fondet for a grant making possible an invaluable visit to the Marinbiologisk Laboratorium.

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[*] Papers from the 'Dana' Oceanographical Collections, No. 18.

For details of 'Dana' stations cited below, see Dana-Report, No. 1, Copenhagen, 1934.

1. *Funchalia* (*Funchalia*) *danæ*, sp. n.

Holotype ♀, St. 4017 VII; carapace length 32 mm.

Rostrum unarmed ventrally, petasma asymmetrical; most nearly related to *F. woodwardi* Johnson.

Rostrum with 10+1 to 12+1 teeth dorsally, its lateral ridge well defined. Hepatic spine persistent even in the largest adults. Frontal margin of the carapace below the antennal projection is only moderately convex, with well-defined pterygostomian spine set well above the antero-inferior angle; more as in *F. woodwardi* than as in *F. villosa* (Bouvier). Ridge running posteriorly from the pterygostomian spine is short, only about five times as long as the spine, in contrast to more than ten times in *F. woodwardi*. Sides of sixth pleonic somite with only the faintest trace of a second longitudinal ridge between the midlateral one and the ventrolateral margin, instead of a strong second ridge as in *F. woodwardi*.

Dactyl of the fourth leg less than one-third as long as the propodus in large adults.

Petasma asymmetrical, very nearly as in *F. woodwardi*.

Thelycum differs from that of other species of the subgenus *Funchalia* and resembles that of the subgenus *Pelagopenæus* in that the lateral hoods are produced as flaps which cover over the sperm receptacle.

2. *Funchalia* (*Funchalia*) *taaningi*, sp. n.

Holotype ♀, St. 3920 III, carapace length 16·2 mm.

Rostrum unarmed ventrally, petasma asymmetrical; very nearly related to *F. villosa* (Bouvier).

Rostrum with 5+1 to 6+1 teeth dorsally, its lateral ridge poorly defined. Hepatic spine present in juveniles, absent in adults. Frontal margin of the carapace below the antennal projection slopes anteriorly to join the pterygostomian spine without a definite point of demarcation. Frontal margin ventral to pterygostomian spine slopes posteriorly, as in young juveniles of *F. villosa*, instead of vertically or even anteriorly as in adults of *F. villosa*. Sides of sixth pleonic somite without a trace of a second longitudinal ridge between the midlateral one and the ventrolateral margin.

Dactyl of fourth leg more than two-thirds as long as propodus in large adults; relatively much shorter in juveniles. Chela of third leg from 4·3 mm. long at a carapace length of 9 mm. to 4·5 mm. long at a carapace length of 16 mm., as compared with lengths of 3 and 4 mm. at the respective sizes in *F. villosa*.

Petasma differs from that of *F. villosa* only in lacking a small projection from the middle of the lateral edge of the free, distal part of the larger endopod.

Thelycum differs from that of *F. villosa* in having a large tooth-like rather than a very small median ridge or tubercle on sternite XIV posterior to the receptacular depression; and in having the ridges, which form the posterior continuation of the lateral hoods bounding the posterior half of the receptacular depression, straight somewhat as in *F. woodwardi* instead of curved as in *F. villosa*.

3. *Bentheogennema stephenseni*, sp. n.

Holotype ♂, St. 3624 I; carapace length 11 mm.

A podobranch, extending little if at all beyond the corresponding epipodite, present on somites VIII–XII, statolith autogenous; petasma without lobus accessorius, thelycum without intermediate prominences between the scutes of sternites XII and XIII; nearly related to *B. intermedia* (Bate).

Carapace much as in *B. intermedia*, differing from that of *B. borealis* (Rathbun) and *B. pasithea* (DeMan) in having the cervical and post-cervical sulci less closely approximated dorsally, the infra-antennal angle less produced and angular, and the pterygostomian spine weaker although not so much so as in *B. intermedia*. Telson nearly as in *B. borealis*, bearing only one midlateral and one distal pair of spines, the spines of the distal pair widely separated by the straight terminal margin of the telson.

Eye nearly as in *B. intermedia*, its corneal diameter approximately three-fifths that of the stalk at the level of the tubercle.

Petasma nearly as in *B. intermedia*, differing in having the middle part of the distal margin, between the distoventral and the distomedian projections, nearly straight instead of decidedly convex.

Thelycum as in *B. intermedia*.

4. *Sergestes* (*Sergestes*) *erectus*, sp. n.

Holotype ♂, St. 3579 I, carapace length 19·2 mm.

Organs of Pesta present, both margins of the two distal segments of the fifth leg ciliated, third maxillipede not greatly enlarged; most nearly related to *S. seminudus* Hansen and to *S. henseni* Ortmann (a species to which is referable the petasma figured by Sund as of *S.* "*corniculum* Kr.").

Supraorbital spine lacking. Hepatic spine well-developed, its buttress separated from the longitudinal carina anterior to it by a transverse sulcus. Ocular tubercle high, much more so than in *S. henseni* and *S. seminudus*. Posterior arthrobranch of XII not one-third as long as the anterior one.

Lobus armatus of the petasma not bent over, and bearing a continuous row of hooks from base to tip, as in *S. seminudus*. Lobus connectens differs from that in *S. seminudus* and resembles that in *S. henseni* in being well separated from lobus terminalis, slender, and armed only with a single hook at the tip.

Base of third leg and genital sternites of the female much as in *S. henseni*, but the median longitudinal ridge at the posterior margin of the twelfth sternite is not as well defined; the median protuberance posteroproximal to the coxa of the third leg has a rounded median margin rather than a somewhat projecting one such as is usual in *S. henseni*; there is a large convexity distal to the proximal tooth on the median margin of the coxa, rather than a minute projection, the projection on the posteromedian face of the coxa laterodistal to the large proximal tooth has a longer and straighter median edge than in *S. henseni* and has a distal angle rather than a spine or tooth.

5. *Sergestes* (*Sergestes*) *disjunctus*, sp. n.

Holotype ♂, St. 3630 IV, carapace length 16 mm.

Organs of Pesta present, both margins of the two distal segments of the fifth leg ciliated, third maxillipede not greatly enlarged; most nearly related to *S. henseni* Ortmann and to *S. seminudus* Hansen.

Supraorbital spine well developed. Hepatic spine well developed, its buttress separated from the longitudinal carina anterior to it by a transverse sulcus. Ocular tubercle very low. Posterior arthrobranch of XII nearly half as long as the anterior one.

Lobus armatus of the petasma not bent over, its median edge with an unarmed interval between a proximal and a distal group of hooks, as in *S. henseni*. Lobus connectens stout, not far separated from lobus terminalis, armed with numerous hooks along its distal edge.

Base of third leg and genital sternites of female somewhat as in *S. henseni*, but there is no clearly defined median longitudinal ridge at the posterior end of the twelfth sternite; the median protuberance posteroproximal to the coxa of the third leg projects nearly as much as in *S. seminudus* but has a less angular median margin as in *S henseni* rather than a sharply angular one; the projection on the posteromedian face of the coxa, laterodistal to the large proximal tooth, is a simple convexity without a tooth or spine such as it bears in *S. henseni*.

6. *Sergestes* (*Sergestes*) *coalitus*, sp. n.

Holotype ♂, St. 3737 I, carapace length 22 mm.

Organs of Pesta present, both margins of the two distal segments of the fifth leg ciliated, third maxillipede not greatly enlarged; resembling *S. rubroguttatus* Wood-Mason (*nec* Pesta) except in petasma, which is like that of *S. erectus* Burkenroad.

Supraorbital spine lacking. Hepatic spine very small, its buttress not separated from the longitudinal ridge anterior to it by a transverse sulcus such as occurs in the related species other than *S. rubroguttatus*. Ocular tubercle moderately low; eye-stalk very long, cornea of moderate size. Posterior arthrobranch of XII less than one-third as long as the anterior one.

Petasma almost indistinguishable from that of *S. erectus*, differing from that of *S. rubroguttatus* in that the lobus armatus is not bent over, reaches beyond the processus ventralis and bears a continuous row of hooks from base to tip.

Base of third leg and genital sternites of female nearly as in *S. rubroguttatus*, differing only in that the median ridge at the posterior end of the twelfth sternite is rounded although strongly defined, instead of being a high lamellate projection. Base of third leg differs from that of related species other than *S. rubroguttatus* by the following combination of characters : Median protuberance posteroproximal to the coxa with rounded, not sharply angular or tooth-like median margin ; apex of postero-lateral precoxal protuberance directed more posteriorly than laterally ; middle of the median edge of the coxa, distal to the large basal tooth, convex, and distal to this convexity with a subrectangular projection ; projection on the posteromedian face of the coxa laterodistal to the large proximal tooth bears a distinct but small tooth which does not project as far as to the median margin of the joint.

7. *Sergestes* (*Sergestes*) *verpus*, sp. n.

Holotype ♂, St. 3739 IX, carapace length 7·8 mm.

Organs of Pesta present, both margins of the two distal segments of the fifth leg ciliated, third maxillipede greatly enlarged and with dactyl divided into five subsegments, posterior arthrobranch of XII a lamella ; very similar to *S.* "*sargassi* Ortmann" of Hansen, 1922, but with a petasma more like that of *S. pestafer* Burkenroad.

Supraorbital spine of carapace completely absent. Suture which runs ventrally from the middle of the cardiacobranchial sulcus is reinforced with a heavy chitinous rib.

Third maxillipede much as in *S.* "*sargassi*."

Lobus armatus of petasma large, nearly two-thirds as long as processus ventralis ; bearing a pair of terminal hooks and a row of four hooks which occupy its median margin. Processus ventralis with a row of two or three stellate disks occupying the median third of its armed antero-distal margin ; the lateral two-thirds of the antero-distal margin with a serrate edge ; two or three minute spines at the tip. Lobus terminalis large, armed only at the tip, which bears two hooks or groups of hooks. Lobus inermis represented only by an undefined swelling or a very minute rudiment on the lateral edge of the capitulum at about the level of the tip of lobus armatus. Lobus connectens represented by a large hook on the median edge of the capitulum somewhat beyond the mid-point between its base and the armed tip of lobus terminalis.

Female unknown.

8. *Sergestes* (*Sergestes*) *index*, sp. n.

Holotype ♂, Dana St. 3630 II, carapace length 6 mm.

Organs of Pesta present, both margins of the two distal segments of the fifth leg ciliated, third maxillipede greatly enlarged and with dactyl divided into five subsegments, posterior arthrobranch of XII a lamella; very nearly related to *S.* "*sargassi* Ortmann" of Hansen, 1922, from which it differs only in petasma.

Lobus armatus of petasma directed laterally, not distally; somewhat more than half as long as the processus ventralis, bearing a terminal group of hooks and one hook in the middle of its median margin. Processus ventralis with a series of stellate disks along its entire distal margin instead of having a serrate armature on the lateral part of its tip. Lobus terminalis and lobus inermis subequal in size, divergent; lobus terminalis armed only with a single terminal hook. The capitulum below the lobus terminalis lacks the median hook which seems to represent the lobus connectens in *S.* "*sargassi.*"

Female unknown.

9. *Sergestes* (*Sergestes*) *stimulator*, sp. n.

Holotype ♂, St. 3656 VIII, carapace length 9·4 mm.

Organs of Pesta present, only one margin of the two distal segments of the fifth leg ciliated, third maxillipede greatly enlarged and with dactyl divided into four subsegments; nearly related to *S. diapontius* Bate, *S. vigilax* Stimpson, and *S. incertus* Hansen.

Rostrum short and deep, with a very short tip, like that of *S. vigilax.* External edge of proximal antennular segment slightly longer than the distal segment. Third maxillipede most like that of *S. incertus*: the proximal subsegment of its dactyl with six spines along the median edge, antepenultimate subsegment with four, penultimate with two, ultimate with one in addition to the terminal spine; penultimate subsegment of dactyl slightly more than half as long as ultimate; propodus subdivided by a joint. Ciliated part of the external margin of the exopodite of the uropod about four times as long as the uncilated part.

Petasma with rather short lobus armatus; lobus terminalis long, slender, ridged along the anterior face, the ridge twisted and with a small cusp toward its base; lobus inermis conoidal with a small projection in the middle of its proximomedian edge.

Genital area of the female much as in the related species.

10. *Sergestes* (*Sergestes*) *tantillus*, sp. n.

Holotype ♂, St. 3556 II, carapace length 5·7 mm.

Organs of Pesta present, only one margin of the two distal segments of the fifth leg ciliated, third maxillipede greatly enlarged and with dactyl divided into six subsegments; nearly related to *S. edwardsi* Krøyer.

Third maxillipede about as in *S. edwardsi*: the pair of spines at tip of the dactyl subequal, as long as or longer than the distal two subsegments of the dactyl combined; antepenultimate subsegment of the dactyl with a quite long spine on its lateral margin.

Petasma with three conspicuous projections along the lateral edge of pars media proximal to the processus ventralis, as in *S. edwardsi* (the middle one of these projections being much less developed in *S. orientalis*). Lobus connectens with a long finger-like tip, not short and bilobed as in *S. edwardsi* and *S. orientalis*. Posterior lobule of lobus terminalis conspicuously longer than the short, stout, fleshy, hook-bearing anterior lobule. Lobus inermis with a well-defined heel-like proximomedian projection.

Genital area of the female much as in the related species.

11. *Sergestes* (*Sergestes*) *semissis*, sp. n.

Holotype ♂, St. 3905 I, carapace length 4 mm.

Organs of Pesta present, only one margin of the two distal segments of the fifth leg ciliated, third maxillipede greatly enlarged and with dactyl divided into six subsegments; related to *S. orientalis* Hansen and to *S. edwardsi* Krøyer and *S. tantillus* Burkenroad.

Third maxillipede about as in *S. edwardsi* and *S. tantillus*.

Petasma with the middle of the three projections along the lateral margin of pars media proximal to the processus ventralis low and rounded, as in *S. orientalis*. Lobus connectens large and conical, directed laterally, not bilobed. Both lobules of lobus terminalis large and fleshy, subequal in size; the posterior lobule directed medially instead of distally as in the related species. Lobus inermis conical, not much larger than the lobus connectens, with a small papilliform protuberance on its proximomedian edge.

Female unknown.

12. *Sergestes* (*Sergia*) *scintillans*, sp. n.

Holotype ♂. St. 3622 1, carapace length 7·2 mm.

Organs of Pesta absent, numerous dermal photophores with well-developed cuticular lenses; most nearly related to *S. lucens* Hansen and to *S. prehensilis* Bate.

Rostrum moderately deep, with moderately long point; no dorsal tooth. Cervical sulcus shallow dorsally, postcervical deep. No hepatic spine or projection. Posterior arthrobranch of twelfth somite about half as long as the anterior one and slightly smaller than the posterior arthrobranch of the thirteenth somite. Cornea of eye of moderate size, its greatest length only about two-thirds the dorsomedian length of the distal segment of the stalk.

Photophore pattern unique: a row of seven in antennal scale; one at base, one at tip of eye-stalk; none on body of mandible, one in palp; one in labrum; two lateral to the base of the maxilla; two lateral to the base of the third maxillipede; none in coxa-basis of second maxillipede, one at tip of ischium, one at base of merus, one at base and one at tip of carpus, one at tip of propodus of second maxillipede; a row of twelve very minute photophores in branchiostegite (as otherwise only in *S. prehensilis*); none in area of hepatic projection; none median to the bases of the fourth and fifth pleopods; four in the midline of the sixth pleonic sternite, one at its anterolateral corner; two or three in the exopodite of the uropod; and others.

Tip of antennular peduncle of male without distal spine or enlarged setæ.

Petasma with small processus ventralis, not two-fifths as long as the short, stout lobus armatus (processus ventralis longer than lobus armatus in *S. prehensilis*, completely absent in *S. lucens*, where lobus armatus is very long). Lobus accessorius short. Lobus connectens of moderate size, with only a short proximo-lateral protuberance. Lobus terminalis small, closely applied to anterior base of lobus connectens, much as in *S. prehensilis*. Lobus inermis large, lamellar, oblong, and widely separated from lobus connectens.

Coxa of third leg of the female somewhat as in *S. prehensilis*, but both the distal and the proximal tooth-like projections of the median margin much more elongate.

13. *Sergestes* (*Sergia*) *stellatus*, sp. n.

Holotype ♂, St. 3908 I, carapace length 7·1 mm.

Organs of Pesta absent, numerous dermal photophores with well-developed cuticular lenses; related to *S. fulgens* Hansen and *S. splendens* Hansen.

Rostrum deep, with a short point and only a very weak trace of dorsal tooth. Cervical sulcus shallow dorsally, postcervical deep. Hepatic projection well developed but not acutely pointed. Posterior arthrobranch of the twelfth somite small, less than one-third as long as the anterior gill. Cornea of eye very large, its greatest length considerably more than the dorsomedian length of the distal peduncular segment.

Photophores as in the related species.

Inferior antennular flagellum of the male much as in *S. fulgens*. Distoventral margin of distal segment of antennular peduncle of male with a rounded lamellate crest but not spinose; at the proximal end of the crest originates a pair of greatly enlarged, sinuose, blunt-tipped setæ.

Petasma with lobus armatus reduced to a small papilla not one-half as long as lobus accessorius, which latter is itself small, not one-fifth as long as the processus ventralis. Lobus connectens much broadened as compared with related species; lobus terminalis (homologue of the lobe figured as anterior lobule of " lc. " in *S. splendens* by Hansen, 1922) slender and not bilobed. Lobus inermis (homologue of the lobe figured as " lt." in *S. splendens* by Hansen, 1922) reduced to a small papilla.

Female genital area much as in the related species.

14. *Sergestes* (*Sergia*) *creber*, sp. n.

Holotype ♂, St. 3766 XVIII; carapace length 16 mm.

Organs of Pesta absent, cornea of the eye longer and considerably broader than the stalk, numerous lensless dermal photophores including conspicuous unpaired median ones in pereionic sternites; related to *S. robustus* Smith. Nearly related to (identical with ?) *S.* "*bisulcatus* Wood-Mason" of Hansen, 1919 (*nec* Wood-Mason).

Rostrum elevated, moderately deep at base with a long tapering tip; no more than a trace of dorsal tooth. Cervical sulcus well-marked laterally, absent dorsally. Post-cervical sulcus very faint laterally, very deeply cut across the dorsum.

Unciliated part of the external margin of the uropodal exopod about 2·3 times the ciliated part. Posterior arthrobranch of XII little more than two-thirds as long as the anterior one, about equal to the posterior arthrobranch of XIII, about four-fifths as long as the anterior arthrobranch of XIII. Cornea of the eye large, about one-fifth longer than the distal joint of the stalk and as wide as long; hardly a trace of ocular tubercle.

Some of the photophores are as follows: Exopod of uropod, a row of 6 to 9 discrete bodies median to the central muscle, a longitudinal row of 2 to 3 distal to the muscle. Antennal scale, a row of 10 to 15 distally, one obscure photophore at base. Middle of pleonic sternites, a pair in advance of the first pair of pleopods, a single one in advance of the last four; a pair behind the first three pairs of pleopods; a single one behind the fourth and fifth; one between the last three pairs of pleopods; a median row of 6 to 8 on the sixth sternite. Pereiopods, one in the base of ischium and of merus of all five legs; a row of 2 additional in proximal part of ischium of fifth leg; 5 additional in ischium, 12 in merus, one in base of propodus of fourth leg; 9 in distal part of merus of third leg; 8 in distal part of merus of first leg.

Petasma somewhat as in *S. robustus*, differing as follows: Lobus armatus reaches as far as does lobus connectens, much beyond processus ventralis, which does not reach as far as does the lobus terminalis; lobus armatus with an unarmed interval between a large distal hook and two large hooks in the middle of its length, three small hooks between middle and base. A well-defined and heavily armed though small lobus accessorius. Heavily armed proximolateral part of lobus connectens not so swollen and heel-like as in *S. robustus*. Lobus terminalis not reaching higher than lobus inermis, not nearly as high as lobus connectens. A well-defined blunt projection at the lateral base of the lobus armatus.

Third leg of the female differs from that of all named species of *Sergia* in having a long, acute, curved, scythe-like coxal projection which reaches nearly to the midline.

15. *Sergestes* (*Sergia*) *extenuatus*, sp. n.

Holotype ♂, St. 3999 II ; carapace length 12 mm.

Organs of Pesta absent, cornea of the eye longer and considerably broader than the stalk, numerous lensless dermal photophores including an unpaired median one in pereionic sternite XI ; very nearly related to *S. robustus* Smith.

Rostrum very short and deep, with a small spiniform point and a minute dorsal tooth close behind it. Cervical and post-cervical sulci both shallow but continued across the dorsum.

Unciliated part of the external margin of the uropodal exopod about 2·1 times the ciliated part. Posterior arthrobranch of XII little more than three-quarters the length of the anterior one, equal to the posterior gill of XIII, which is four-fifths as long as the anterior gill of XIII. Cornea of the eye large, about one-seventh longer than the distal joint of the stalk and wider than long ; hardly a trace of ocular tubercle.

Some of the photophores are as follows : Exopod of uropod, none. Antennal scale only one, near the base. Pleonic sternites, a single obscure median photophore between each pair of pleopods ; a large crescentic one near the posterior end of the sixth sternite. Pereiopods, a conspicuous photophore at the proximo-median end of the ischium of all five legs ; a faint one in the basis of the fourth and fifth legs ; a faint one in the proximal end of the merus of the second, third, and fourth legs. The numerous photophores present in uropodal exopod, antennal scale, and meri of first, third, and fourth legs of adults of *S. robustus* are thus lacking in *S. extenuatus*, while the conspicuous proximomedian photophore in the ischium of the first leg of *S. extenuatus* is missing in *S. robustus*, where this joint instead bears a small photophore on its lateral edge.

Petasma nearly as in *S. robustus* but lobus connectens larger, stouter than lobus terminalis instead of slenderer; lobus armatus thickened at the tip and with more than a third of its median margin unarmed between the large distal hooks and the proximal series.

Genital area of female much as in *S. robustus*, but the distal end of the median edge of the coxa of the third leg with a large triangular tooth rather than a small angle; and the crest near the median edge of the posterior face of the coxa low and straight-edged, instead of bilobed and extending to the median margin as in *S. robustus*.

16. *Sergestes* (*Sergia*) *maximus*, sp. n.

Holotype ♂, St. 3933 I; carapace length 41·5 mm., total about 136 mm.

Organs of Pesta absent; cornea of eye longer and considerably broader than the stalk, numerous lensless dermal photophores including conspicuous unpaired median ones in pereionic sternites; nearly related to *S. robustus* Smith.

Rostrum very short and deep, nearly square; with a minute tip and a minute dorsal tooth close behind it. Cervical and post-cervical sulci both moderately deep, clearly cut across the dorsum.

Unciliated part of the external margin of the uropodal exopod about 2·1 times as long as the ciliated part. Posterior arthrobranch of XII more than three-quarters as long as the anterior one, about equal to the posterior arthrobranch of XIII, six-sevenths or more as long as the anterior arthrobranch of XIII.

Cornea of the eye very large, its length slightly greater than that of the distal article of the stalk; its breadth greater than its width. Stalk of unique shape; long, very slender in the middle, expanding considerably at base and tip. Ocular tubercle minute.

Some of the photophores are as follows: Exopod of uropod, a single large crescentic transverse organ just at tip of the median muscle. Antennal scale with a long stripe of photogenic tissue, distally separated into discrete organs, down the middle of its distal half; no proximal photophore as in *S. robustus*, but a short oblique stripe on the median side of the proximal half of the scale. Middle of pleonic sternites, a single photophore in advance of each pair of pleopods, that of the first two segments appearing to be composed of a fused pair ; a single wide photophore behind each pair of pleopods, all five appearing to be composed of a fused pair ; sixth sternite with a row of four organs and one between the bases of the uropods ; no photophores between the pleopods. Pereiopods, one conspicuous organ in the base of the ischium of all five legs and one in the base of the merus of the first three legs, on the median side ; fourth leg with one in the ischium and one in the merus on the outer side ; third leg with a long stripe down the outer side of the merus ; first leg with a photophore at end of carpus on outer side.

Petasma much as in *S. robustus* but lobus armatus not half as long as processus ventralis, which latter reaches well beyond lobus terminalis ; lobus connectens longer, its heel-like proximal part reaching the base of lobus armatus, its tip far beyond lobus terminalis ; lobus inermis more than half as large as lobus terminalis and directed medially ; a small papilla in the fork between lobus terminalis and lobus inermis somewhat as in *S. phorcus* Faxon.

Twelfth sternite of the adult female differs from that of all described species in that there are a pair of protuberances with deeply hollowed faces at its posterior margin (these concavities absent in a small female). Third leg of the female with a moderately large, bluntly pointed projection from the proximomedian corner of the coxa, immediately distal to which is a smaller but conspicuous blunt tooth, somewhat as in *S. phorcus* Faxon and also as in *S. bisulcatus* Wood-Mason [*nec* Hansen].

17. *Sergestes* (*Sergia*) *potens*, sp. n.

Holotype ♂, St. 3975 VII. Carapace length 25·5 mm., total about 85 mm.

Organs of Pesta absent, cornea of the eye much longer and broader than the stalk, numerous lensless dermal photophores including conspicuous unpaired median ones in pereionic sternites ; nearly related to *S. phorcus* Faxon and *S. grandis* Sund.

Rostrum moderately long, very deep, subrectangular ; with a minute slender tip and a rudimentary dorsal tooth. Cervical and post-cervical sulci very shallow laterally, hardly or not at all continued across the dorsum.

Unciliated part of the external margin of the uropodal exopod twice the ciliated part. Posterior arthrobranch of XII four-fifths the length of the anterior one; about one-tenth longer than the posterior gill of XIII; about equal to the anterior gill of XIII. Cornea of the eye enormous; its length and its diameter both twice that of the short, slender distal segment of the stalk; no trace of ocular tubercle.

Some of the photophores are as follows: Uropodal exopod, a single file of three to five organs distal to the muscle, none median to it. Antennal scale, a row of nine to twelve in the distal part, a short oblique stripe in the median side of the proximal part; no photophore in the centre of the base of the scale. Middle of pleonic sternites, a single one in advance of the first four pairs of pleopods, one between the last three pairs, a pair behind the first three pairs of pleopods, one behind the fourth and fifth pairs; sixth pleonic sternite with a median row of about five photophores, and one between the uropods. Pereiopods, one in the base of the ischium of all five legs; one in the tip of the ischium of the second through fifth legs; one in the tip of the merus of the fourth and fifth legs; one in the tip of the carpus of the fifth, 2 in the fourth leg; a row of 10 to 12 in the merus of the third, of 6 in the second leg.

Petasma much as in *S. phorcus* and *S. grandis*, with lobus connectens proximolaterally produced as an armed finger-shaped protrusion. Lobus armatus large as in *S. phorcus*, but with a well-defined lobus accessorius at base larger than that in *S. grandis*. Processus ventralis expanded at base with a slender tip; relatively short, not reaching as far as does lobus terminalis. Lobus terminalis bears an armed proximolateral lobule which is much better defined than in *S. phorcus*, but is much smaller than the well-developed distomedian part of lobus terminalis instead of much larger than a rudimentary distomedian part as in *S. grandis*.

Genital sternites and base of third leg of female not greatly different from these parts in *S. phorcus*.

18. *Sergestes* (*Sergia*) *bigemmeus*, sp. n.

Holotype ♂, St. 3570 VI; carapace length 12 mm.

Organs of Pesta absent, cornea of the eye much longer and considerably broader than the stalk, numerous minute lenseless dermal photophores including obscure paired but no median organs in pereionic sternites; most nearly related to *S. gardineri* Kemp, *S. richardi* Hansen [of which *S. crassus* Hansen is a synonym] and *S. kröyeri* Bate [with which *S. tropicus* Sund. and *S.* "*tenuiremus* Krøyer" of Hansen are identical].

Rostrum very short and deep with a marked ventrodistal angle, nearly square; with a short point and no more than a rudiment of dorsal tooth. Cervical sulcus faint laterally, hardly apparent dorsally; post-cervical moderate laterally, deeply impressed across the dorsum, and with only a very inconspicuous inflection at the midline.

Unciliated part of external margin of uropodal exopod about two and one-half times the ciliated part. Posterior arthrobranch of XII about four-fifths as long as the anterior one, about equal to the posterior gill of XIII, about seven-eighths as long as the anterior gill of XIII. Cornea of the eye much as in *S. richardi*, large, flattened, about one and two-thirds as long as the short, wide, flattened distal joint of the stalk. Ocular tubercle large and high.

Photophore pattern much as in *S. richardi*. Uropodal exopod with a row of about 12 to 14 very minute organs placed close to the median margin along nearly the entire length of the appendage; antennal scale with a similar row placed farther from the margin. A pair of photophores between each of the first four pairs of pleopods, a single one between the fifth; a pair in the middle behind and an obscure single organ before the first three pairs of pleopods; sixth pleonic sternite without median photophores but with a row of minute ones along its lateral margins. Inter-pleopodal photophores without even so slightly developed a cuticular lens as that which accompanies these organs in *S. richardi* and *S. gardineri*. A photophore mediodistally in the basis and the ischium of all five legs.

Petasma differs from that of *S. richardi* and *S. gardineri* and resembles that of *S. kröyeri* in having well-developed lobus accessorius and lobus inermis and in lacking a clearly defined proximolateral lobule on lobus connectens. Petasma differs from that of *S. kröyeri* in that its lobus armatus is uncurved, longer than the processus ventralis, and reaches nearly as far as does the lobus connectens;

its lobus inermis is larger and stouter, reaching as far as does the lobus connectens ; and its lobus terminalis is less than a third as long as the lobus inermis and directed laterally.

Coxa of third leg of female differs from that in *S. richardi* in that the proximomedian nib is set off from the crest which guards the opening of the oviduct posteriorly, instead of being continuous with it as in *S. richardi*. The nib is deep and subrectangular, not cut into two sharp teeth as in *S. kröyeri*, not sub-lanceolate as in *S. gardineri*.

19. *Sergestes* (*Sergia*) *inequalis*, sp. n.

Holotype ♂. St. 3768 ; carapace length 12·5 mm.

Organs of Pesta absent, cornea of the eye much longer and considerably broader than the stalk, numerous lensless dermal photophores including obscure paired but no median organs in pereionic sternites XI and XII ; most nearly related to *S. bigemmeus* Burkenroad.

Rostrum of moderate size, sub-pentagonal in shape, with a small slender terminal spine and no dorsal tooth. Cervical sulcus moderate laterally, absent dorsally. Post-cervical sulcus weak laterally but clearly cut across the dorsum ; not inflected in the midline.

Unciliated part of the external margin of the uropodal exopod about 2·2 times the ciliated part. Posterior arthrobranch of XII about three-quarters as long as the anterior one, about equal to the posterior arthrobranch of XIII, slightly more than five-sixths as long as the anterior gill of XIII. Cornea of the eye large, nearly twice as long as the short, broad peduncle ; ocular tubercle well-défined but minute.

The photophores are translucent in formalin-preserved material, rather than opaque or pigmented as in other species, and are consequently difficult to discover. Uropodal exopod with a row of 12 to 14 small photophores along its median margin. Antennal scale with a row of about 12 along its midline, of which the distal 2 are fairly large and conspicuous, the proximal organs minute and obscure. Pleonic sternites appear to bear very obscure photophores at the median base of pleopods of anterior pairs, and possibly unpaired median organs anterior to the pairs of pleopods ; photophores seem to be lacking completely from the sixth pleonic sternite. There is a fairly conspicuous photophore at the mediodistal end of the ischium of all five legs, and a much more obscure one at the mediodistal end of the basis.

Petasma peculiar: Processus uncifer with only the rudiment of a hook at its tip. Lobus armatus relatively very short, directed laterally; similar in size and shape to the relatively large lobus accessorius; both lobus armatus and lobus accessorius only lightly armed. Processus ventralis short, broad, and flattened. Lobus connectens with a short unarmed distal part, and a long, slender, distally lightly armed projection on its lateral side; the whole shaped somewhat as an inverted high-heeled boot. Lobus inermis directed posterodistally, of moderate size but conspicuously over-reaching the lobus connectens. Lobus terminalis unarmed, somewhat smaller than the lobus inermis and directed laterally.

Genital area of female distinguished by a high transverse sinuose ridge at the posterior end of sternite XII, followed by a well-defined median longitudinal crest on XIII. Coxa of third leg somewhat as in *S. bigemmeus*.

20. *Sergestes* (*Sergia*) *filictum*, sp. n.

Holotype ♂, St. 3549 IV; carapace length 15·5 mm.

Organs of Pesta absent, cornea of the eye considerably shorter than the stalk although moderately broader, a few lensless dermal photophores including obscure paired but no median organs in pereionic sternites; nearly related to *S. plumeus* Illig and less closely so to *S. bisulcatus* Wood-Mason [*nec* Hansen] and to *S. gardineri* Kemp.

Rostrum short and deep; rounded, or anterodorsally truncated with resultant definition of a short, blunt terminal point. Both cervical and post-cervical sulci deeply cut across the dorsum, shallower laterally. Habitus rather slender with sides of carapace inflated by the enormous gills; integument rather membranous.

Unciliated part of the external margin of the uropodal exopod more than two and one-half times the ciliated part, as compared with two and one-quarter times in adults of *S. plumeus* and two times in *S. bisulcatus*. Gills extremely voluminous, their primary branches very long. Posterior arthrobranch of XII only one-third as long as the anterior one; not half as long as the posterior gill of XIII, which is six-sevenths of the anterior gill of XIII and about one-quarter as long as the carapace. *Cornea of the eye in males about seven-eighths, in females about four-fifths as long as the distal segment of the* moderately long and slender stalk; as compared with adults of *S. plumeus* and *S. bisulcatus* in which the cornea is considerably longer than the stalk. Ocular tubercle low but distinct.

Photophores completely absent from antennal scale and from exopod and endopod of uropod, as compared with *S. bisulcatus*, in which there is a photophore in base of antennal scale and of uropodal endopod. An obscure pair in the middle behind the anterior four pairs of pleopods, a single one behind the fifth. A photophore in the base of the ischium of the fourth and fifth legs, and one at the base of the merus of the first three legs.

Petasma quite similar to that of *S. phorcus* Faxon, but slenderer and more lightly armed, with a longer distal part of lobus connectens, and without hooks at base of lobus terminalis. Petasma very like that of *S. bisulcatus* and of *S. plumeus*; differing from the former in having lobus armatus shorter than processus ventralis, lobus armatus with several small hooks scattered along the proximal two-thirds of its median margin and no hooks at base of lobus terminalis; and from the latter in having lobus armatus at least four-fifths as long as the processus ventralis; the proximolateral projection of lobus connectens directed laterally rather than proximally, and the distal part of lobus connectens curved in its distal fifth instead of its distal half as in *S. plumeus*.

Coxal nib of third leg of female with median margin only shallowly incised and with rounded corners, instead of being conspicuously cleft into two tooth-like projections as in *S. plumeus* and *S. bisulcatus*.

21. *Sergestes* (*Sergia*) *laminatus*, sp. n.

Holotype ♂, St. 3933 I; carapace length 9·5 mm.

Organs of Pesta absent, cornea of the eye not as long as the stalk and only moderately broader, no dermal photophores; most nearly related to *S. kröyeri* Bate and to *S. japonicus* Bate [with which *S. mollis* Smith is identical].

Rostrum low and rounded. Integument membranous. Cervical sulcus deeply cut laterally and dorsally; post-cervical absent.

Unciliated part of the external margin of the uropodal exopod nearly three times the ciliated part. Posterior arthrobranch of XII a lamella unprovided with filaments or with from a rudiment up to six well-developed pairs of filaments distally; filament-bearing part at most one-quarter as long as the anterior gill of XII. Posterior gill of XIII from one-half to three-quarters the length of the anterior one; anterior gill of XIII more than *five-sixths as long as the anterior one of XII. Eye strikingly variable sexually: cornea in the female not two-thirds the length of the distal segment of the peduncle and not twice as broad as the base of the latter; in the male four-fifths the length of the peduncle and twice its breadth.* Peduncle shorter, broader, and distally more enlarged in male than in female. Ocular tubercle conspicuous though not as high as in *S. kröyeri.*

Lobus armatus of petasma short and curved, not reaching the middle of processus ventralis and without any well-defined lobus accessorius. Processus ventralis flattened and very broad, leaf-shaped. Lobus connectens short, not reaching nearly as far as does processus ventralis, with a short slender tip and a swollen base. Lobus terminalis very large, reaching far beyond lobus connectens and the short, slender lobus inermis.

Female genital sternites and coxa of third leg much as in *S. japonicus.*

IV.—*Two new* Acrididæ *from Afghanistan.* By B. P. Uvarov, D.Sc., British Museum (Natural History).

A list of Orthoptera known from Afghanistan has been published recently by Mistshenko (J. Bombay Nat. Hist. Soc. xxxix. 1937, pp. 796–811), but the seventy-eight species recorded in it certainly represent only a portion of the fauna. A small collection made at my request by Dr. S. A. Akhtar in the neighbourhood of Kabul proved to contain several additions to the list, as well as at least one remarkable new species, while another new Acridid as amongst the few specimens collected by Mr. J. L. Chaworth Musters also near Kabul.

The present paper contains only the descriptions of the two new species, while faunistic records will be published elsewhere.

Sphingonotus purpureus, sp. n.

This species exhibits a superficial resemblance to *Thalpomena splendens* Uvarov (Trav. Inst. Zool. Acad. Sci. U.R.S.S. i. 1933, p. 198), described from Baluchistan, mainly because of the beautiful light purple coloration of hind wings which have no dark band. The structural characters (vertex, pronotum, relatively narrow elytra, and hind femora) indicate, however, that it should be referred to the genus *Sphingonotus*. That genus, monographed recently by Mistshenko ('Eos,' xii. 1936-37, pp. 65–282), so far contained no species with the type of wing coloration observed in *S. purpureus*.

♀. Of medium size; body compressed laterally, with sparse hairs.

Head scarcely projecting above pronotum. Eyes broadly oval, vertical diameter being 1·3 of the horizontal, and a little greater than the subocular distance. Face in profile distinctly oblique. Frontal ridge well raised except at the clypeus, constricted at the fastigium and again at the median ocellus; surface coarsely punctured, deeply excavate from the base of antennæ down to below midway between the ocellus and the clypeal edge. Fastigium of vertex sloping, projecting forwards, forming a distinct angle with the frontal ridge; surface distinctly concave; margins well raised, subparallel in the posterior portion, nearly convergent anteriorly; width of vertex subequal to that of the frontal ridge between antennæ. Occiput with a faint median carinula. Foveolæ of vertex elongate, weakly concave.

Pronotum distinctly constricted in prozona. Front margin weakly ascendant, distinctly prominent in the middle, where it is slightly notched; hind margin well produced, obtusely angulate, with the apex rounded. Submarginal sulcus distinct, broad; other sulci deep; surface between them distinctly gibbose. Metazona nearly twice the length of prozona, weakly convex, with distinct rounded shoulders. Median carina distinct in front of the first sulcus; weak and irregular, but perceptible, between the sulci; somewhat raised in the anterior part of metazona, becoming gradually lower behind. Surface of pronotum obsoletely rugulose and punctured. Lateral lobe more than half again as deep as it is long; front margin sinuate; front lower angle obtuse; lower margin sinuate; lower hind angle over 90°, broadly rounded; surface punctured-rugulose, more particularly in the metazona.

Mesosternal interspace a little wider than its length and narrower than a lobe.

Valvæ of the ovipositor short, almost concealed from above; lower valva with a strong rounded tooth and acute recurved apex; its basal part smooth.

Elytra extending almost to the apex of hind tibiæ; their length five times their maximum width; apex bent back, obliquely parabolic. Venation moderately dense. Apical part of the second radial vein with four branches; intercalate vein not very regular, straight, placed in the anterior third of the area and slightly approximate to the radial in the apical part. Wings elongate, twice as long as broad.

Hind femur slender, its length four times its maximum width. Hind tibia with 9–10 outer and 10 inner spines.

General coloration ochraceous, with greyish markings on head and pronotum. Elytra weakly coriaceous, their membrane even in the apical portion slightly infumate; greyish-brown disjointed spots in the places of the usual fasciæ. Wings basally light purple. Hind femur on the inner and lower side black, with a whitish pre-apical ring. Hind tibia brownish black, with a broad, but imperfectly defined light fascia near the base. Hind tarsus white.

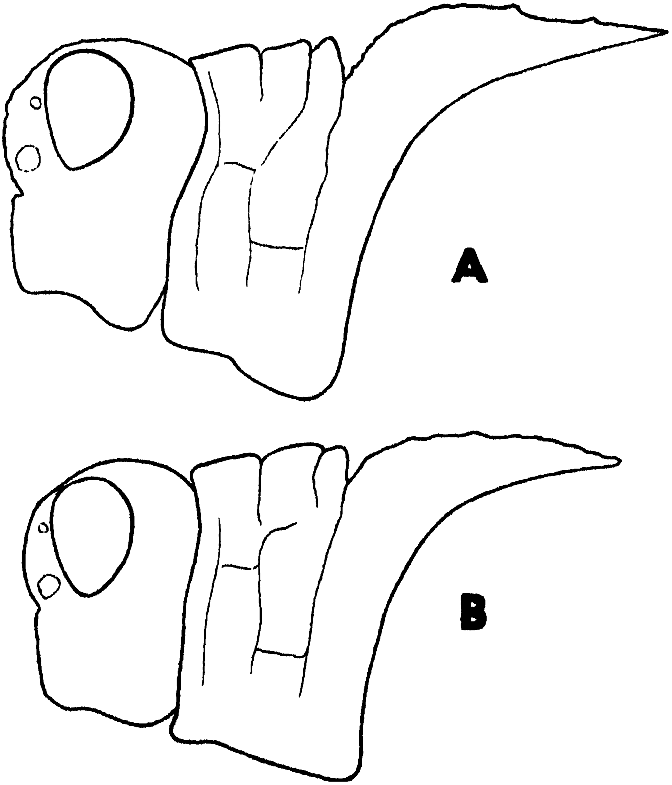
Length of body 22; pronotum 4·6; elytra 21; hind femur 13 mm.

AFGHANISTAN: Dukhtar-a-Kaffin Hill, near Kabul, 7500 ft., 5–18. vii. 1938, 1 ♀ (*Dr. S. A. Akhtar*).

The presence of a faint median carinula between pronotal sulci suggests that this species might be referred to the genus *Thalpomena*, which is not very clearly separated from *Sphingonotus*, but the narrow elytra and hind femora, as well as distinctly saddle-shaped pronotum, agree better with *Sphingonotus*. Within that genus the new species is unique in the coloration of hind wings.

Tmethis afghanus, sp. n. (Fig. A.)

Very similar in appearance to *T. bicoloripes* Moritz (Ann. & Mag. Nat. Hist. ser. 10, iv. 1929, p. 537), but differing from it by the structure of head and pronotum (compare figs. A and B), by the coloration of hind legs, and by the wider black fascia of hind wing delimiting a rectangular basal yellow area.



A. *Tmethis afghanus*, sp. n., type, ♂.
B. *Tmethis bicoloripes* Moritz, paratype, ♂.

From another yellow-winged species, *T. cinerascens* St., the new species differs by strongly raised pronotal carina, which in the former is very low in metazona, and by wider wing fascia.

♂. Face vertical, with low callous tubercles. Frontal ridge above ocellus parallel-sided, tuberculate; under the ocellus depressed and crossed by a transverse sulcus; further down moderately raised. Fastigium of vertex weakly sloping, rounded in profile, its width scarcely greater than that of an eye; surface distinctly concave; margins tuberculate. Foveolæ of vertex irregular, but there is a pair of supplementary oval foveolæ close to the middle of the anterior margin.

Pronotum compressed laterally, constricted in prozona, strongly gibbose. Anterior margin obtusely produced forward, with a series of round tubercles. Median keel in prozona tectiform, dissected into three portions, the first two being subequal in length and with the upper edge straight, while the third is obtusely conical; metazona is strongly gibbose, the median keel raised well above the level of the prozonal keel. Surface of prozona with small rounded tubercles; that of metazona with larger tubercles and irregular longitudinal ridges. Posterior angle very acute. Lateral lobe much deeper than long; anterior margin strongly sinuate; lower anterior angle slightly over 90°, rounded; lower margin distinctly sinuate; posterior lower angle rounded.

Elytra reaching well beyond the middle of extended hind tibiæ. Wings relatively short and broad, their apical lobes broadly rounded.

Hind femur moderately broad, rugulose and tuberculate externally. Upper carina moderately expanded; its upper margin irregularly wavy, with some small tubercle-like teeth. Lower carina less expanded and practically straight.

Subgenital plate short, conical.

General coloration pale ochraceous-grey, with indefinite grey markings. Wing light sulphur-yellow in the basal part and faintly yellowish beyond the fascia; fascia broad, its maximum width being about one-third of the length of the radius; the inner margin of the fascia is first straight, then bent under a right angle; outer margin is separated from the margin of the wing only by a very narrow whitish fringe. Mesonotum, metanotum, and first abdominal tergites with some bluish-grey markings. Hind femur on the inside pale greyishviolaceous; knee on the inside blue; tibia light rose, with the base blue; tarsus whitish.

Length of body 39; pronotum 12 (prozona 4, metazona 8); hind femur 19; elytra 35; wing 31; width of wing 20; maximum width of wing fascia 8 mm.

AFGHANISTAN: Arbarp, 10 m. W. of Kabul, 3000 ft., 2 ♂♂ (*J. L. Chaworth Musters*).

V.—*Stφrmer on the Appendages of Trilobites.*

By Prof. W. GARSTANG, M.A., D.Sc., Oxford.

ENROLLED individuals of an Ordovician species of *Ceraurus* from the Trenton Limestone, New York, provided Walcott sixty years ago with material for his first sections displaying biramous appendages. Those sections, however, were discontinuous, and left many uncertainties. Recently Leif Størmer of Oslo has re-studied Walcott's collection at Harvard, and, with Prof. Raymond's permission, has ground down several of the original specimens and photographed the ground surfaces at small intervals (about 1/20 mm.). In this way he has secured in effect a continuous series of fine horizontal sections through the ventral thoracic region, and of longitudinal sections through the pleural region. The result is a substantial paper on "The Thoracic Appendages of Trilobites and their Phylogenetic Significance" (Leif Størmer, Norsk. geol. tidsskr. xix. 1939, pp. 143–273), in which the greater number of the photographic sections and various diagrammatic reconstructions have been admirably reproduced.

Among other things the author shows that the coxal segment of *Ceraurus* lacks the conspicuous "gnathobase" which looms so large in previous restorations of this and other Trilobites. It is represented by a slight median ridge without bristles (the "endobase"). The coxa is robust, with an unusual structure, being expanded asymmetrically on its posterior side by a broad triangular flange or shield strengthened by radiating ridges which converge on the endobase and project at the periphery as pointed processes. The branchial ramus (or "exopodite") conforms neither to Walcott's nor

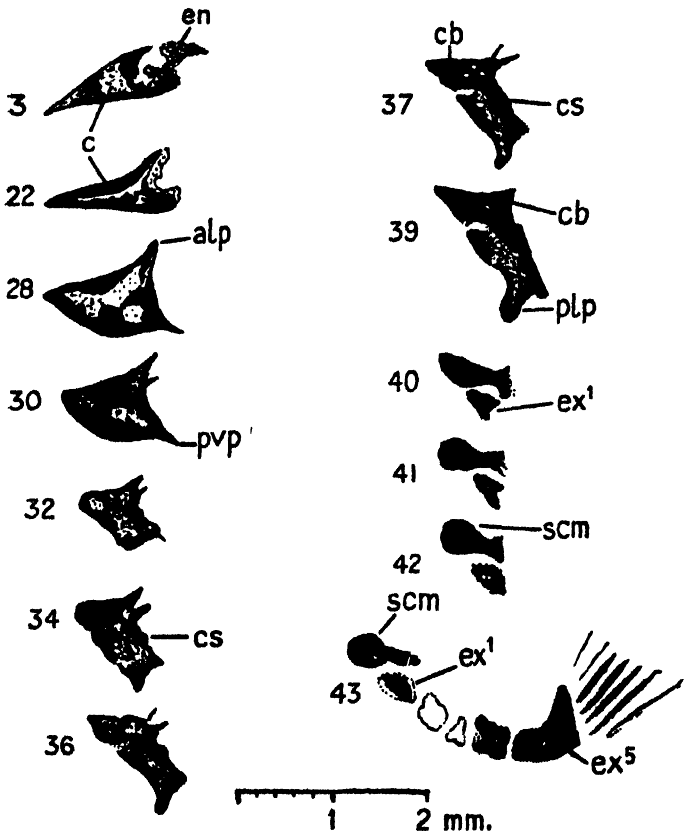
Raymond's restoration, but consists of a five-jointed stalk, flattened and expanded distally, and terminating in a semicircular fan of blade-like filaments. Its basal joint is covered by the coxal shield.

The significance of these new facts, however, is somewhat eclipsed by a more striking claim of the author to have discovered a "precoxal segment" at the base of the appendage, to which the branchial ramus is said to be attached. This branch is accordingly regarded as a "pre-epipodite," and quite distinct from the Crustacean exopodite. The new view is at once extended to Trilobites in general, fresh restorations are provided of the appendages of *Neolenus*, *Triarthrus*, and other genera, and the bearings of the new conception on the relations of Trilobites to other Arthropods are discussed in considerable detail. Crustacean affinities are treated as remote.

Størmer's claims are principally based on the evidence of composite glass slides and on wax models prepared from enlargements of the photographic sections, although his reproductions of these in figs. 3, 5, and plates 5–8 show them to be ill-fitted to settle critical matters of boundary lines and exact relations. Presumably, however, his "semi-diagrammatic sketches" in figs. 8–10 embody the essential features of these models, and these can be checked from the photographic sections. It will suffice to consider the case of the best exposed appendage, no. iii., which was selected by the author as the basis for his reconstruction in fig. 10.

The precoxa is restored as an oblong subtriangular block, 1·4 by 0·5 mm., set obliquely on the sternal surface with its narrow end pointing outwards and backwards (fig. 9). The specimen is supposed to be lying on its back, so that the ventral surfaces of the various parts lie uppermost. An oblong slit in the upper wall and an oval gap in the posterior wall (fig. 10) mark the assumed regions of articulation with coxa and outer ramus ("pre-epipodite") respectively. The height of the precoxa is about 0·3–0·4 mm.

The somewhat tetrahedral coxa is shown resting on the precoxa with its long axis transverse. Its narrower external end gives origin to the walking-leg; its broad posterior flange (the coxal shield) projects freely and overhangs the basal joint of the branchial ramus. The



Showing horizontal sections of appendage iii, from the originals in Strømer's plates 1–3—slightly enlarged freehand copies. The appendage belongs to the left side of a specimen lying on its back.

3–43	Numbers of the sections at intervals of 1/20 mm.
alp.	Anterior lateral process of coxa.
c.	Coxa.
cb.	Coxal body.
cs.	Coxal shield.
en.	Endopod (fragment of basal segment).
ex.	Exopod, segments 1–5 (in 43 slightly reduced).
plp.	Posterior lateral process of coxal shield.
pvp.	Posterior ventral process of coxal shield.
scm.	Subcoxal membrane (" precoxa ").

segment is 2 mm. in length (transversely), 1·5 mm. in breadth (along the admedian base of the coxal shield), and 1·8 mm. in height.

The relevant sections of appendage iii are copied freehand, but to a slightly larger scale, in the accompanying figure. The first 19 are all much alike (3–22), so that only the first and last are included. They cut through the ventral half of the coxa horizontally (the ventral side being uppermost), and each appears as a slender isosceles triangle, with a sharply pointed apex admedially (the coxal endite, *ce*, or "endobase"), and with a concave base externally, where the concavity is occupied by a variable fragment of the decayed basal joint of the endopod (*en*). From 26 to 39 the sections invade the coxal shield, and the shape changes gradually to rhomboidal, by a progressive expansion of the posterior margin (in the figures obliquely below and to the right). In 28–34 they cut through the "postventral" process, and in 36–39 through the "postlateral" ridge and its stout terminal process. After reaching its maximum extension in 39 the coxal shield disappears abruptly in the next section (40).

It should be noted that in 36 a transverse crack nearly severs the shield (*cs*) from the main body of the coxa (*cb*), and persists in the next two sections (37–39). It is quite distinguishable from a pale streak along the middle of the shield in the same sections, which presumably indicates a mere difference in the density of the chitin at different levels.

After the disappearance (*i. e.*, below the level) of the coxal shield, the single structure of previous sections is replaced by two small bodies completely independent of one another (40). The anterior body is the larger. It exactly underlies the body of the coxa (*cb*), has the same width and transverse orientation, but has lost its quadrangular outline, becoming definitely pyriform from 41 onwards, until in 48 it merges into the body-wall. All the points mentioned mark this body as the collapsed subcoxal membrane (*scm*), *i. e.*, the flexible extension of the coxa on which the appendage swung. It shows no signs of independence as a separate segment.

The smaller wedge-shaped body behind it is revealed in the following sections (41–43) as the basal joint of the branchial ramus or exopod (*ex*). It exactly underlies the anterior end of the inner black strip of the coxal shield, behind the " crack " (36–39).

The depth of the subcoxal zone, as measured by the eight sections (40–48) involved, at an average of 1/20 mm. each, amounts to 0·4 mm., which is the height of the " precoxa " according to Størmer's figure 10. On the other hand, according to the scale provided with the sections (pl. 1), the maximum diameter of the subcoxal membrane (40–48) nowhere exceeds 0·8 mm., which is considerably less than the diameter of the " precoxa " (1·4 mm.) given by Størmer (p. 177 and fig. 9).

There is, in fact, a serious discrepancy in Størmer's account. When describing the coxa (pp. 177–8) and reconstructing its form (figs. 8, 10), he treats the structures in sections 36–39 as coxal, and rightly so, as we have seen, for without them there would be no authority for the wide backward extension of the coxal shield and its post-lateral process shown in his reconstructions. But in his lettering of sections 32, 36, and 39 he draws the limit between coxa and precoxa at a higher level, viz., between 34 and 36, and, in his account of the " pre-epipodite," he explicitly includes sections 36 39 in his " precoxal region " (p. 180). These, as we have seen, are the sections which reveal the origin of the branchial ramus. They cannot bear two conflicting interpretations. Either they are coxal, as implied in his fig. 10, and as assumed above, in which case his " precoxa-preepipodite " theory lacks any basis ; or they are really precoxal, in which case his account of the coxa and its processes must be rejected. The evidence of the sections plainly supports the former alternative and opposes the latter.

Strangely enough, it is to the sections only that Størmer points in support of his thesis, although his reference is extraordinarily vague and inadequate. " Following the sections," he says, " through the precoxal region (36–48), we notice a distinct line of division between the *two elongated segments lying side by side* " (p. 180). The reference, though not explicit, can only be to the two dark strips in the coxal shield of sections 36–39, with the pale median streak between them. The body of the coxa, combined with the outer strip, he labels " precoxa," and the inner strip " preepipodite " (pl. 3). That is the whole of his case, when combined with the fact that his models showed the " precoxa " and " pre-epipodite " lying underneath the coxal shield ! Was confusion ever worse confounded ?

The incorporation of the outer strip of coxal shield in his " precoxa " accounts for the excessive length (1·4 mm.) and obliquity of position which he assigns to the precoxa in his restorations, and his identification of the inner strip with the basal joint of his " preepipodite " accounts for the horizontal position which he gives to this basal joint in his final figure (pl. 11, *a*).

On the contrary, if we turn once more to the sections here figured, it is evident that the inner black strip of sections 36 and 37 undergoes a reduction of its length in 39, together with a widening of its area in front, and that the first section of the basal joint in 40 *exactly underlies this anterior thickening*. Thereafter the basal joint continues to extend downwards and slightly outwards (41–43) until it reaches the plane of the other segments of the ramus in 43 45. The only possible conclusion is that the branchial ramus is an outgrowth from the inner surface of the coxal shield, just as the branchial epipodites of Amphipods are outgrowths of the inner surfaces of the coxal plates of that group. In each of these cases the arrangement must be regarded, of course, as highly specialized.

Throughout this discussion my use of the words " upper," " deeper," " downwards," etc. has always been in relation to the supposed position of the animal lying on its back. Presumably, when the animal was walking about, the coxal shields were horizontal, and the branchial rami would project upwards from them to spread outwards in the space underlying the pleurites.

Thus, on the evidence of his own sections, Hr. Størmer's revolutionary thesis falls to the ground, and pages of premature phylogenetic speculation go with it. The branchial ramus of Trilobites is demonstrated to be, as was generally believed, a " coxal " outgrowth.

This does not, of course, mean that its possible homology with the exopod of Crustacea is ruled out, since it is far from certain that the coxa of Trilobites is the same thing as the coxa of Crustacea. Dr. Gurney and I have recently urged that the six-jointed endopod of primitive

Malacostraca, following the "basis," is comparable with the six-jointed leg of Trilobites, following the "coxa," in which case the so-called coxa of Trilobites is a misnomer, given at a time when the constitution of the Crustacean leg was imperfectly understood. It is almost certainly a "basis," in which case the outer rami of the legs in the two groups are strictly homologous as exopodites. This argument is scarcely upset by Hr. Størmer claiming the middle claw of Trilobites as an additional segment upon very slender and dubious grounds (pp. 218, 249). In any case the crucial homologies lie at the base of the appendage, not at its tip, and can only be satisfactorily determined after a survey of the whole organisation.

In the paper just cited *, which had evidently escaped Hr. Størmer's notice, attention was drawn to several points which seem firmly to establish the derivation of Crustacea from Trilobite ancestors. It may be useful briefly to recall those points here, since the original paper has not had the wide circulation of a regular periodical :—

(1) The Devonian fossil *Lepidocaris*, so fully and carefully described by Scourfield, shows an unmistakable relationship to Anostracous Branchiopoda on the one hand, and to Mesonacid Trilobites on the other. The pleural "scales" which overlap the bases of its appendages are clearly forerunners of the proepipodites of Anostraca, yet are of somatic origin, and no less clearly homologous with the pleura of Trilobites.

(2) There is a precise correspondence in bodily structure and segmentation between *Lepidocaris* and the Anostraca on the one hand, and the anomomeristic Mesonacids on the other, as well as between Malacostraca and the Olenelline Mesonacids with fixed segmentation.

From these premises it appears to follow that Mesonacid Trilobites of the Lower Cambrian were the actual ancestors of Crustacea, probably twice over,—the Branchiopoda having been derived directly from anomomeristic forms with a di-tagmatous body, the Malacostraca from the monotagmatous Olenelline forms with fixed segmentation.

If such intimate relations as these be admitted between

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* Garstang, W., and Gurney, R. : "The Descent of Crustacea from Trilobites, and their Larval Relations," in 'Evolution : Essays presented to Prof. E. S. Goodrich on his 70th Birthday.' Oxford : Clarendon Press, 1938, pp. 271–285.

early Trilobites and Crustacea, we cannot be deterred by a mere confusion of segmental names from assuming that the exopod of Crustacea is stricly homologous with the branchial ramus of Trilobites, in which case it probably owes its development as a swimming-organ to the disappearance of the sub-pleural chamber, within which, in Trilobites, its activities were confined. The lengthening of the protopodite, the addition of a new segment (the true "coxa"), and the establishment of firm connections between coxa and sternum, mark successive stages in the Crustacean advance towards greater locomotive and prehensile efficiency.

VI.—*The* Otitidæ *and* Phytalmidæ *of the Solomon Islands* (*Diptera*). By JOHN R. MALLOCH, Arlington, Va.

[Plate I.]

THE materials upon which this paper is based were submitted to me for identification by Sir Guy A. K. Marshall, Director of the Imperial Institute of Entomology, and will be returned to him. The types will be deposited in the British Museum (Natural History), This is the largest collection of these families as yet reported upon from the Solomon Islands, and includes a number of very interesting species several of them new to science. As is usual in the Otitidæ from this region the great majority of the species belong to the subfamily Platystominæ, only two species being of another subfamily, and both of these quite widely distributed in the region. In a report on the Otitidæ of New Guinea now ready for the press, to be published in Australia, I have included a key to the genera of the Australian and Pacific Island regions, to which paper this one may be considered as complementary.

Family **Otitidæ**.

Subfamily *ULIDIINÆ*.

CHRYSOMYZA Fallén.

Dipt. Suec., Scenopinii, p. 3 (1817).

At least two species of this genus are very widespread, almost cosmopolitan, in their distribution, the one in the collection being one of them.

Chrysomyza ænea (Fabricius).

Ent. Syst. vol. iv. p. 335 (*Musca*) (1794).
Ulidia melanopsis Walker, List. Dipt. Ins. Brit. Mus. pt. 4, p. 397 (1849).

This species occurs in Australia, Hawaii, many parts of Asia, and even in America, probably spread through commerce, as the larvæ feed in decaying vegetable matter.

Six specimens, Tulagi, cow-dung, February 1933, and one specimen labelled British Solomons, January 1932, taken by R. A. Lever.

PSEUDEUXESTA Hendel.

Gen. Ins. fasc. 106, p. 30 (1910).

Pseudeuxesta prima (Osten Sacken).

Ann. Mus. Stor. Nat. Genova, vol. xvi. p. 470 (*Euresta*) (1881).
Euxesta semifasciata Malloch, Ins. of Samoa, pt. 6, Dipt. fasc. 5, p. 216 (1930).

This species is very widely distributed in the Orient and southward to Samoa and several other groups of the Pacific Islands, having been recently found in Hawaii.

Originally described from Celebes. Single specimens are in the collection from Tulagi, 7. vii. 1936, and 18. viii. 1935, and Russell Island, Karamola, 20. ix. 1934 (*R. A. Lever*).

Subfamily *PLATYSTOMINÆ.*

All the species in the collection belong to already described genera, but several of them, though closely similar to others occurring in New Guinea, are undoubtedly undescribed. The best represented genus is *Euprosopia* Macquart. I do not know what the larval habits of the members of this genus are, but in *Scholastes* Loew, which is also represented by several species, there are species that attack the coconut-palm.

DASYORTALIS Hendel.

Abhand. k. k. zool.-bot. Gesell. Wien, Bd. 8, Heft 1, p. 277 (1914).

This genus is readily distinguished from any other as yet found in the Solomons by the dense, short, erect hairs on the eyes and the two pairs of upper reclinate orbital bristles.

The four known species of the genus occur in New Guinea. There is but one of them in the present collection.

and it was described by Curran as a new species under a new genus of the family Psilidæ as cited under the species below.

Dasyortalis complens var. *fasciata* (Curran).

Proc. Cal. Acad. Sci. vol. xxii. no. 1, p. 54 (*Lasiopsila*) (1936).

I have dealt with the distinguishing characters of this variety in another paper, which also includes a key to all the species of the genus. This is to be publised in Australia, and may be consulted for further data on the genus.

It may yet be proven that this is a valid species, but my present opinion is that it is merely a variety.

I have seen it from New Britain; the type-locality is Matema Island. In this collection there are twenty-three specimens, taken in the main on Guadalcanal and Savo Islands, with two specimens labelled Tulagi, and other two with illegible locality labels. Several have the notation "on *Musa*." All taken by R. A. Lever.

PLAGIOSTENOPTERINA Hendel.

Abhandl. k. k. zool.-bot. Gesell. Wien, Bd. 8, Heft 1, p. 52 (1914).

This genus contains a large number of species and occurs in Africa, Asia, and southward through the Malayan region into Australia.

Plagiostenopterina enderleini Hendel.

Op. cit. p. 56.

Six specimens of this species in the collection from the following localities:—Guadalcanal: Lunga, 2. iv. 1934 (*R. A. Lever*). Isabel: Haivo, 8. vii. 1935 (*R. A. Lever*). Tulagi: 7. viii. 1934 (*R. A. Lever*); 31. viii. 1933 (*H. T. Pagden*). Russell Is.: Lingatu (*R. A. Lever*).

ELASSOGASTER Bigot.

Ann. Soc. Ent. France, p. 546 (1859).

This genus has about the same distribution as the next preceding one, and contains over a dozen species. In the present collection there are two that appear to be undescribed.

Elassogaster marginalis, sp. n.

Male and *female*.—A dark metallic blue or green species with the head, except the occiput, and the legs, except the fore tibiæ and tarsi, a portion of the hind tibiæ, and the apices of the mid- and hind tarsi, fulvous-yellow; fore tibiæ and tarsi black. Wings greyish hyaline, with a brown costal cloud from apex of the subcostal vein to apex of fourth, darkest in the stigma, fading out from near costa behind and obsolescent behind third vein except at apex (Pl. I. fig. 6).

Head glossy on face and frons, orbits and parafacials silvery-white-dusted, occiput glossy black, centre and lower parts usually yellowish. Frons about 1·75 times as long as wide, somewhat bulged up in front, smooth, with many short fine pale hairs and four strong vertical bristles; postocular bristle and genal bristle strong. Face slightly concave centrally in profile, rather evenly convex and glossy, white-dusted only in upper portions of the foveæ. Antennæ and palpi fulvous-yellow, third segment of former slightly angulate at apex above and about five times as long as wide; aristæ bare, slightly thickened on basal sixth.

Thorax glossy, rather densely piliferous punctate, mesonotum with a complete central white-dusted vitta on which the hairs are also white, the hairs on other parts dark. Bristles as follows: humerals 1 or 2, notopleurals 2, supra-alar 1, postalars 2, dorsocentrals one pair, prescutellar acrostichals 0, scutellars 4. Disc of the scutellum with many fine hairs. Pleura with white dust on the propleura, a band over the centre of the sternopleura and hind margin of the mesopleura, and on the pleurotergite; mesopleural bristle strong. Most of the hairs dark.

Fore femur with a well-developed series of bristles on the apical half of the posteroventral surface; mid-tibia with a quite strong apical ventral bristle.

Wings rather narrowly pointed; first posterior cell much narrowed at apex, where it is not half as wide as at outer cross-vein; inner cross-vein a little beyond middle of the discal cell, more so in the female than in the male; outer cross-vein slightly curved. Lower squama well produced beyond upper, both white. Knobs of halteres yellow.

Abdomen coloured as thorax, undusted, dark-haired, fifth tergite in male as long as third and fourth combined.

Length 5–7·5 mm.

Type, male, and allotype, Guadalcanal: Lunga 9. vi. 1935.

Paratypes, Tulagi: 15. iii. 1934; 29. viii. 1933 (*H. T. Pagden*). Guadalcanal: Kaukau, 23. viii. 1934; Mauronia, 15. viii. 1934.

Nine specimens, all collected by R. A. Lever except where otherwise indicated.

Elassogaster nigripes, sp. n.

Female.- A small glossy black species with a bluish tinge on the thorax and the abdomen violet-blue. Legs black. Wing with a sharply defined black apical spot (Pl. 1. fig. 7).

Head black, antennæ brownish yellow, third segment darkened above, about three times as long as wide, angulate at apex above; aristæ brownish yellow, bare, swollen on a short length at base; palpi black-brown. Frons about 1·33 times as long as wide, the orbits whitish-dusted, surface shiny, with many short pale hairs; verticals 4; postocular bristle weak, genal strong. Face depressed above middle, with a slight raised central line above, lower half projecting to epistome; parafacials, foveæ, and upper half of face white-dusted.

Mesonotum with whitish dusting and surface as in *marginalis*, and with the same bristling, but the basal pair of scutellars shorter, and only one fine hair in front of each basal bristle, the disc bare.

Legs black, fore coxæ brownish at apices, bristles as in *marginalis*.

Wings greyish hyaline, stigma yellowish, and a black mark extending irregularly across the field from costa midway between apices of second and third veins to the fourth vein and filling the area in front of the latter to wing-tip. First posterior cell narrowed at apex; inner cross-vein at middle of the discal cell; outer cross-vein curved. Squamæ white. Halteres with yellow knobs.

Fifth abdominal tergite shorter than fourth.

Length 5·5 mm.

Type, Russell Island: Lingatu, vii. 1933 (*R. A. Lever*).

It is pertinent to note here that *marginalis* is closely similar to *lineata* de Meijere, a species not included by Hendel in his key. From it, however, the new species may be distinguished by the fact that the hind tibiæ are dark brown except basally, the outer cross-vein of the wing is not dark clouded, and the propleura is white-dusted.

The other new species belongs to the same group as *sepsoides* Walker, but the entirely black legs readily separate it from any described species likely to occur in the Solomons.

Hendel omitted another species of de Meijere from his key and misnamed it *albolineatus* instead of *albopilosus* in his footnote on page 71. This species has the wing without dark markings, and, like *lineata*, occurs in New Guinea.

PSEUDOEPICAUSTA Hendel.

Op. cit. p. 112.

There are about a dozen species of this genus known, but only one is in the present collection.

Pseudoepicausta chalybea (Doleschall).

Nat. Tijdschr. v. Nederl.-Ind. vol. xvii. p. 125 (*Herina*) (1858).

Twenty-five specimens from the following localities :—Tulagi, Guadalcanal (Ruavatu), Santa Isabel, Santa Mata, Malaita, taken by R. A. Lever, and H. T. Pagden.

RIVELLIA Robineau-Desvoidy.

Ess. Myod. p. 729 (1830).

Of this large and almost cosmopolitan genus there are but three species before me in the present collection ; Curran has recorded a third one, *basilaris* (Wiedemann).

Rivellia fusca (Thomson).

Herina fusca Thomson, Eugen. Resa, Dipt. p. 575 (1868).

A series of specimens that I accept as this species has the black fasciæ on the wings narrower than shown by Hendel in his figure (*op. cit.* pl. i. fig. 8), but in other characters they agree with his description. The thorax and abdomen are blue-black or greenish black, sometimes reddish at base of the latter.

Guadalcanal, eight specimens (*R. A. Lever*) ; Russell Island, three specimens (*R. A. Lever*) ; Tulagi, one specimen (*H. T. Pagden*).

Rivellia rufibasis Malloch.

I am unable to give a reference to this species as the description is in the press in the large paper on New Guinea Otitidæ already referred to.

Two paratypes, Tulagi, and St. Isabel.

Rivellia fulvescens, sp n. (Pl. I. fig. 10.)

Female.—Similar in the wing-markings to *fusca* Thomson and *basilaris* Wiedemann, but the entire insect is bright fulvous-yellow, including the legs and other appendages. The third antennal segment is a little shorter and wider than in *fusca*. The mesonotum has the same bristles, the mesopleura and pteropleura each have a single bristle, the basal pair of scutellar bristles are shorter than the apical pair, and there are some fine discal hairs also on the scutellum. In the markings of the wing there is a slight but marked difference in the course of the black stripe over the outer cross-vein; this in *fusca* is straight, attaining the costal margin at a little distance before the tip of the second vein, where it connects with the costal apical stripe, there being a small but distinct hyaline mark above the apex of the second vein, which mark occurs also in *basilaris*. This feature is well shown in the two figures given by Hendel. In the new species the fascia referred to curves forward slightly as it approaches the costa (Pl. I. fig. 10) and ends nearer to the apex of the second vein, above the tip of which latter there is no hyaline mark as in the other two species. Squamæ white, knobs of halteres yellow, the latter dark brown in the other two species.

Length 3 mm.

Type, Lunga, Guadalcanal (*R. A. Lever*).

The type-specimen is in rather poor condition, but it is apparently mature despite its pale colour. It is possible that this is the species recorded as *basilaris* Wiedemann by Curran, but there is absolutely no dark colour on the thorax or abdomen in my specimen.

SCHOLASTES Loew.

Mon. N. Amer. Dipt. vol. iii. p. 38 (1873) ; Hendel, *op. cit.* p. 248.

There are about a dozen described species of this genus. Some of them are rather widely distributed throughout the Pacific islands, the most common species being *cinctus* Guérin, but two that I have recently described are found only in Guam as far as I know at this time. I have presented a key to the species of the genus from New Guinea in the paper on the family from that region already referred to herein.

Scholastes cinctus (Guérin).

Platystoma cinctum Guérin, Voy. de la Coq., Zool. p. 299.
Acinia fasciestriata Doleschall, Nat. Tijdschr. v. Nederl. Ind. vol. xiv. p. 416 (1847).
Lamprogaster marginifera Walker, Proc. Linn. Soc. Lond. vol. iii. p. 111 (1859).
Lamprogaster transversa Walker, *op. cit.* vol. i. p. 30 (1857).
Scholastes whitneyi Curran, *op. cit.* p. 24.

This species is the only one known to me in which the supra-alar bristle is lacking. I find that it is very variable in size, depth of colouring of head, thorax, and abdomen, and in the wing-markings.

Curran distinguished his new species, *whitneyi*, by the colour of the hind tibiæ, the new species having these "wholly yellowish," and *cinctus* having them with "brown apical band." The darkening of the apices of the hind tibiæ is extremely variable in the long series of specimens I have examined from many localities, and no value can be attached to the presence or absence of a darker shade, which may be visible or invisible according to the angle from which the tibia is viewed. One large male before me has the tibiæ undarkened at apices and no yellow mark at apices of the fourth and fifth abdominal tergites, but structurally it agrees with more typical examples in this collection, and I consider it merely a variant of the genotype.

Tatamba, St. Isabel, 25. ii. 1934; Guadalcanal, Ruavatu, 2. v. 1934, and one male in poor condition without other locality than Solomons, January 1932 (*R. A. Lever*).

Curran did not record *cinctus* from the Solomon Islands, which further strengthens the supposition that his *whitneyi* is this species.

Scholastes bimaculatus Hendel.

Op. cit. p. 252.
Scholastes solomonensis Curran, *op. cit.* p. 24.

A rather small species, with a brown transverse band across lower third of face and two outstanding brown marks on the costa of the wing, besides the other smaller and less distinct paler brown marks, one at the stigma and the other proximad of the apex of second vein. The supra-alar bristle and the prescutellar acrostichals are present.

I have a rather large male before me from Ganonga Island that agrees in all details with Curran's *solomonensis*, the distinction from typical *bimaculatus* consisting of a slightly less marked accentuation of the dark costal spot near the apex of the second wing-vein.

Specimens from the following islands in the group :—Ganonga, Santa Isabel, Malayta, Utupua, Tulagi, and Guadalcanal, taken by R. A. Lever and H. T. Pagden. Eighteen specimens.

Scholastes aitapensis Malloch.

This is another of the new species included in my report on the Otitidæ of New Guinea recently submitted for publication in Australia.

One paratype male, Shortland, Korovo, 23. iv. 1934 (*H. T. Pagden*).

Scholastes palmyra Curran.

Op. cit. p. 24.

This species is remarkable in that both sexes are described as having a preapical black lamella on the arista. It has the face yellow, pleura mostly yellow, the mesonotum and scutellum black, with the usual stramineous stripe along side each of former and edge of the scutellum. The mesonotum has two pairs of dorsocentrals ; no mention is made in the description of whether the supra-alar bristle is present or absent. The wing-markings are very like those of *bimaculatus*.

Described from Palmyra Island.

Scholastes sexvittatus (Walker).

Proc. Linn. Soc. Lond. vol. v. p. 261 (*Lamprogaster*) (1861).
Scholastes distigma Hendel, *op. cit.* p. 252.

Hendel placed this species as a possible synonym of *frauenfeldi* Schiner, but in his key to the species of the genus that species is separated from *distigma* by the entirely yellow face. In *distigma* there are said to be two black spots on the face, one in the lower extremity of each facial fovea. I have before me a female that agrees very well with the description given by Walker, who says that there is a brown facial band, and after making a careful comparison of it and a male specimen of *distigma* from Borneo I have no hesitation in synonymizing the two under the Walker name. The female has the third abdominal tergite very large, smooth, and covered with numerous short dark hairs, though not densely so. The male of *distigma* was unknown to Hendel, who described the species from Java.

Originally described from Celebes. Above specmens from Guadalcanal, Ruavatu, 29. iv. 1934 (*R. A Lever*).

NAUPODA Osten-Sacken.

Bull. Soc. Ent. France, p. 135 (1881)

Naupoda ventralis Curran.

Proc. Cal. Acad. Sci. vol. xxii. no. 1, p. 26 (1936).

This species was described from two females, and compared briefly with *platessa* Osten-Sacken, to which Curran states it traces in Hendel's key to the species of the genus. I have compared specimens with *platessa* and also with *regina* Hendel, to which latter *ventralis* traces much better in Hendel's key, and find that it agrees with *regina* and differs from *platessa* in the following characters:—One pair of orbitals and a humeral bristle present, mid-tibia with numerous short depressed black setulæ on the ventral surface, antepenultimate section of the fifth vein not half as long as the penultimate, posterior basal cell of wing not entirely brown. From *regina* it differs as follows:—A yellow line extending across lower half of humeri and upper edge of mesopleura to wing-base; posterior basal cell of wing dark brown except an oblique hyaline fascia near its apex, and without a hyaline hind marginal streak, inner cross-vein at or slightly beyond middle of the discal cell; mid- and hind femora with at most the basal two-thirds black, and the mid-tibia without a brown spot near base above; male with the hairs on anterior dorsal edge of the hind tarsus much longer than in *regina*; female genital cone orange-yellow, not black-brown.

Originally described from Choiseul and Malaita Islands. Type-material in the American Museum of Natural History and California Academy of Sciences.

Guadalcanal: no data (*R. A. Lever*); Lunga, no collector's name; Tulagi: Ridge-jungle, 20. vi. 1934 (*H. T. Pagden*); Russell Is.; British Solomons, 25. xi. 1934, 17. xi. 1935 (*R. A. Lever*). Eight specimens.

ASYNTONA Osten-Sacken.

Op. cit. p. 135.

Asyntona flaviceps Hendel.

Op. cit. p. 291.

Originally described from a female taken on Cretin Island, New Guinea.

Tulagi: 10. v. 1936; Guadalcanal: Rere, 12. viii. 1934, *Pandanus* (*R. A. Lever*). Three specimens.

I have seen both sexes from new Guinea. Distinguished from the genotype by the fulvous-yellow head.

LAMPROGASTER Macquart.

Dipt. Exot. vol. ii.–iii. p. 211 (1843).

There is but one species of this large genus in the collection.

Lamprogaster austeni Sharp.

Zool. Results, based on material from New Britain, etc., pt. iv. p. 391, Cambridge (1900).
Lamprogaster xanthoptera Hendel, *op. cit.* p. 225.

A metallic-blue species with unmarked yellowish hyaline wings which have the veins yellow; legs entirely fulvous-yellow. The head is coloured as the legs, with the frons largely black and a brown streak on the lower part of each side of face from the fovea to the epistome and extending over the sides of the prelabrum.

The large vesicular protuberances on the sides of the abdominal membrane described and figured by Sharp are rarely evident in pinned specimens, though one female before me has them prominently exposed.

Hendel described *xanthoptera* from New Pommerania. I have a specimen, apparently from the same lot as the type now before me. Hendel apparently overlooked Sharp's species, as he did not list it in his paper on the subfamily cited above.

Guadalcanal: Rere, 12. viii. 1934; Kukum, 8. xi. 1935; Lunga, 31. x. 1935, 9. vi. 1935, 29. iii. 1934; Kaukau, 20, 22. viii. 1934; Tenaru River, 17. xi. 1935.

Apparently a very common species where it occurs, as there are seventeen specimens in this collection.

EUPROSOPIA Macquart.

Dipt. Exot., Suppl. 2, p. 89 (1847).

This genus contains a large number of species and extends from China to Australia inclusive. No species occur in Africa nor in the New World. Only one species has previously been reported from the Solomon Islands. Below I present a key to the species before me from these islands.

Key to the Species.

1. Scutellum thick at apex, more or less distinctly concave or emarginate in centre of the apical margin, and glossy black or dark brown and tumid on each side of the central emargination; legs black, mid- and hind tibiæ brownish basally, metatarsi of all legs, except their extreme apices, white; wing brown spotted on basal half, with two complete black fasciæ, one over the inner and the other over the outer cross-vein, and a narrower preapical dark fascia that does not attain the hind margin but connects with a similarly coloured costal streak that extends to the apex of the fourth vein. *connexa*, sp. n.

Scutellum usually thin at apex, regularly rounded in apical outline, and nowhere glossy black or dark brown; other characters not all as above .... 2.

2. Scutellum with four bristles; mesonotum without conspicuous broad entire grey or yellow densely dusted vittæ .... 3.

Scutellum with six bristles, the additional pair well in front of the others and placed high on sides, almost subdorsally; mesonotum with densely grey or yellow-dusted vittæ separated by black or dark brown vittæ of the ground-colour of the surface; stem-vein of the wing bare below basad of the humeral cross-vein .... 6.

3. Aristæ quite long-haired, subplumose to beyond the middle; tarsi entirely black; wing with three black fasciæ, the one over the cross-vein and the preapical one connected at hind margin; both sexes with many small lanceolate yellow scales on the dorsum of the abdomen; stem-vein of the wing fine-haired basad of the humeral cross-vein below .... *lepida* Curran.

Aristæ subnude or pubescent on basal fourth or less of its extent; tarsi of at least the mid- and hind legs yellow at bases; wing without well-defined dark fasciæ; neither sex with lanceolate yellow scales on dorsum of abdomen . . . . 4.

4. Fore tarsi entirely black, or only the base of the metatarsus yellowish; wing greyish hyaline, with numerous black spots; a black streak on each side of the face covering the parafacials and foveæ and continued to the opistome; fifth abdominal sternite of the male without exceptional armature; posterior notopleural bristle isolated; tegulæ of the female projecting forward, finger-like; gona about one-third as high as eye . . . . *alticeps*, sp. n.

All tarsi yellow at bases; wings brown, with small subhyaline spots in the cells, those in the marginal cell uniseriate, in submarginal and first posterior cells biseriate and arranged close against the veins; face with at most a brownish mark below each facial fovea; fifth abdominal sternite of male with a downwardly directed tuft of stiff black bristles on each side at apex; posterior notopleural bristle with several almost equally long and strong bristles surrounding it; tegulæ not markedly produced forward in either sex; gona not over one-fourth as high as eye . . . . 5.

5. Extreme apex of first posterior cell of wing narrowly yellowish hyaline (Pl. I. fig. 4); all tibiæ black on apical fourth or more and with a less distinct brown subbasal band or mark; pleura partly grey-dusted, not distinctly vittate . . . . *minor*, sp. n.

Extreme apex of first posterior cell of the wing dark brown; all the tibiæ black on apical fourth or less and without subbasal brown mark; pleura with three conspicuous golden-yellow-dusted vittæ, the central one entire. (New Guinea.) . . . . *miliaria* Hendel.

6. Mesonotum yellow-dusted, with four conspicuous dark brown vittæ, two on the disc that are continued over the sides of the scutellum, and the others on the lateral margins; prescutellar pair of acrostichals lacking; small species, about 7 mm. in length; head, seen from in front, but slightly higher than wide, the frons not, or but little, below level of eyes at vertex, where it is about as wide as one eye . . . . *insulicola*, sp. n.

Mesonotum yellow or yellowish-grey-dusted, with five broad black vittæ, the three on the disc continued to apex of the scutellum, the lateral ones not very distinct; prescutellar acrostichals present, situated proximad of the dorsocentral pair; large species, averaging 12 mm. in length; head, seen from in front, about 1·33 times as high as wide; frons at vertex sunken well below upper level of eyes, and there about one-third as wide as one eye . . . . *depressifrons*, sp. n.

Euprosopia connexa, sp. n.

Female.—Very like *conjuncta* Hendel, to which it will run down in Hendel's key to the species of the genus. It may be readily distinguished from that species by the following characters :—The black fascia over the outer cross-vein is sharply separated from the preapical one by a hyaline stripe (Pl. I. fig. 5), there is no yellow colour in the apex of the submarginal cell connecting the two ; abdomen with the third tergite dull brownish black, the centre with an hour-glass-shaped mark of grey dust that is not sharply defined and a large better defined round grey-dusted spot on either side of it (not coffee-brown, with the basal half grey-dusted) ; apex of second tergite and exposed portions of third, fourth, and fifth tergites with many pale yellow lanceolate scales (not only the apex of the second tergite scaled) ; legs black, all metatarsi except their tips yellowish white, hind tibiæ sometimes slightly brownish basally. In other respects almost identical with *conjuncta*, but in one or two of the specimens there is a short brown line on the costa across the marginal cell between the fasciæ over the cross-veins, in one case connecting with the outermost of them. The lack of this short streak was cited as a character for separating *conjuncta* from *separata* by Hendel, and as far as I have seen it holds in these two species.

In the only specimen of the female of *conjuncta* I have now before me, from Queensland, the tegulæ are tawny yellow and produced forward thumb-like close against the sides of the mesonotum to a little beyond the base of the posterior notopleural bristle. In the new species the tegulæ are pitchy black and much less produced forward, not definitely thumb-like, and falling well short of the base of the posterior notopleural bristle.

Length 8–9·5 mm.

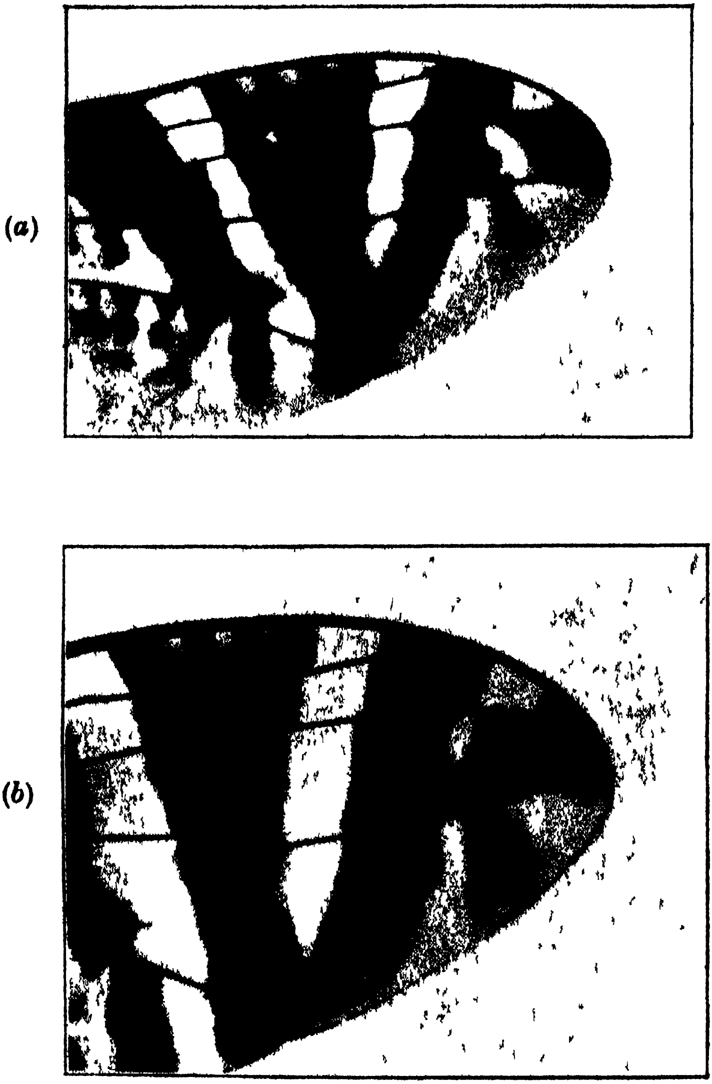
Type and one paratype, Malayta, January 1932 (*R. A. Lever*). Paratypes : Tulagi, 25. xi. 1934 (*R. A. Lever*), and 13. viii. 1933 (*H. T. Padgen*). Four specimens.

Euprosopia lepida Curran.

Proc. Cal. Acad. Sci. vol. xxii. no. 1, p. 25 (1936).

This species is extremely like *impingens* Walker, differing only in the entirely black tibiæ and the slightly

Fig. 1.



(*a*) *Euprosopia lepida* Curran.
(*b*) *Euprosopia impingens* Walk.

different apical marking of the wing (text-fig. 1). Curran separated his species from *fusifacies* Walker by the posterior fusion of the dark fascia over the outer cross-vein and the preapical fascia, a character used by Hendel in his specific key for the separation of *impingens* and *fusifacies*. A careful comparison of specimens of *impingens* from New Guinea with the species from the Solomons shows that the characters cited in the foregoing key taken with my statements above may be depended upon for the separation of the two species.

Originally described from Guadalcanal Island. It is apparently a common species in the Solomons, as there are before me the following :—

Guadalcanal : Papanu, 500 feet, 15 xii. 1934 (*Lever*) ; Ruavatu, 29. iv. 1934 (*Lever*) ; Kaukau, 20. viii. 1934 ; Kookoom, 1934 (*Lever*). British Solomons, October 1931. Malaulalo : Three Sisters, 11. v. 1934 (*Lever*). Tulagi : 25. xi. 1935. Ugi : 6. v. 1934 (*Lever*). Santa Ana. San Cristobal : Waiai, 8. v. 1935. Ngella : Siota, 29. i. 1935 ; Vatilau, vii. 1936.

Euprosopia alticeps, sp. n.

Male.—Occiput black, densely grey-dusted, yellow in centre behind ocelli ; upper third of frons yellowish brown, the short upper orbits densely grey-dusted ; anterior two-thirds of frons black, the orbits and parafacials densely grey-dusted, sides of the face including the foveæ black, merging into brown on the genæ, centre of face testaceous-yellow, sides of labrum fuscous. Antennæ fuscous, base of third segment yellowish ; palpi black. Height of head, seen from in front, less than 1·25 times that of its width ; frons depressed on upper half, at vertex barely one-third of the head-width, widened centrally, with numerous short pale surface-hairs and four extremely short fine vertical bristles. Antennæ about half the length of face, third segment about four times as long as wide ; arista densely short-haired on basal fourth or less, longest hairs about half as long as width of third antennal segment ; palpi narrow. Gena about one-third as high as eye.

Thorax black, with dark grey dust, mesonotum with three inconspicuous irregular black vittæ and the lateral margins black ; pleura irregularly grey-dusted. Mesonotal hairs mainly black, yellow on the humeri, lateral, and posterior margins. Prescutellar acrostichals not differentiated from the long pale hairs; posterior notopleural in male normally backwardly sloped, in female upcurved. Scutellum flattened a little on disc, rounded at apex, the discal hairs mainly yellow, margin with four bristles.

Legs black, fore tarsi in male very slightly yellowish at bases, mid- and hind tibiæ brownish yellow centrally, corresponding metatarsi yellowish white except their tips. No exceptional armature or structures present.

Wing (Pl. I. fig. 3), the markings brownish black. Squamæ grey, margin of upper one fuscous. Halteres brownish yellow.

Abdomen brownish black, slightly shiny, with a large dusted triangle on centre of each tergite extending to apex, with its base on anterior margin grey on composite basal tergite, yellow on the others. No scales present.

Female.—Similar to the male, differing in having the tegulæ yellowish brown, and produced forward fingerlike to, or a little beyond, base of the posterior notopleural bristle.

Length 7–9·5 mm.

Type, male, Guadalcanal, no. 5287; allotype and male paratype, on same mount, topotypical; Ruavatu, 29. iv. 1934 (*R. A. Lever*).

Euprosopia minor, sp. n.

Male and *female.*—A small species belonging to the same group as *miliaria* Hendel, which latter is introduced in the key for comparative purposes. The small size sets it apart from any other species as yet known from the Solomon Islands.

Head brownish yellow, not shiny, occiput blackened laterally and densely grey-dusted, upper orbits and a line along each lateral margin of frons grey-dusted; face with three dark brown dots across near apex of third antennal segment, a dark brown spot in the lower extremity of each antennal fovea, a smaller brown mark below the inner edge of each fovea extending to epistome, and usually an oblique brown line laterad of each of the latter; prelabrum with three small brown dots; parafacials whitish-grey-dusted; antennæ with the upper edge of third segment usually browned; palpi brownish yellow. Frons at vertex slightly less than one-third of the head width at widest point, widened to centre and then narrowed in front, where it is a little wider than at vertex, not sunken above, surface hairs very short and yellowish white; vertex with four moderately strong bristles. Face slightly concave in profile; parafacials linear; gena about one-sixth as high as eye; head almost as wide as high from in front. Antennæ extending to a little below lower third of face, third segment about three and a half times as long as wide; aristæ almost bare, with a few extremely short hairs at base, in the male with a broad apical palette.

Thorax dull black, quite densely yellowish-grey-dusted, the dust paler grey in front on mesonotum, silvery against each humeral callus, the disc with five interrupted blackish vittæ that are rather maculiform and inconspicuous, pleura with but little indication of vittæ though quite noticeably grey-dusted. Bristles as follows:—humeral 1, notopleurals 1 : 1, but there are several strong setulæ surrounding the posterior one that are almost as strong as it, supra-alar 1, postalars 2, dorsocentrals and prescutellar acrostichals one pair of each, the last-mentioned six bristles in an almost straight transverse series; mesopleura without a bristle and with numerous strong black hairs, the pteropleura with most of the long erect hairs white; scutellum short, slightly flattened on disc, rounded at apex, with numerous fine white discal hairs that extend over apex, and four strong apical black bristles.

Wing (Pl. I. fig. 4) brown, with subhyaline dots and short streaks in the cells, the fourth vein bent forward at apex, the fifth vein with some widely separated setulose hairs on the extent of the discal cell above, bare below; no bristle below at the break near base. Squamæ yellowish grey, edge of upper one darker. Halteres yellow.

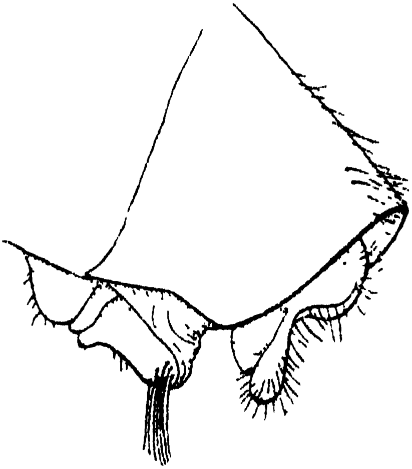
Legs black, grey-dusted on coxæ and femora, extreme tips of latter yellow, tibiæ yellow, the apical third or more black, and a brownish black mark near base that does not entirely encircle it; tarsi whitish yellow on basal segment, and on mid- and hind pairs on basal portion of the second segment also. No exceptional armature present, the posteroventral bristles on fore femur undeveloped.

Abdomen black, slightly shiny, with grey dust, and a large but poorly limited black mark on each side of the third and fourth tergites. Apex of abdomen of male as text-fig. 2.

Length 4–5·5 mm.

Type, male, British Solomons, Guadalcanal, February *1932*; allotype, *Guadalcanal, Lunga,* 26. xi. 1935, no. *3687*; paratypes, one female same data as allotype, one female, Guadalcanar, 4. iv. 1934, one female, Guadalcanal, Tenavatu, 23. ix. 1934, no. 2396, one defective specimen, same locality as allotype but different number, and two females, Isabel Island, one dated April 1935, and the other a broken specimen without date. All eight specimens taken by R. A. Lever.

Fig. 2.



Euprosopia minor, Mall. Apex of abdomen of ♂, lateral view.

Euprosopia insulicola, sp. n.

Male and *female*.—This species is readily distinguished from any other except *depressifrons* in the Solomons by the conspicuously black-and-yellow-striped thorax and abdomen, and from that species by the comparatively wider head and the differently marked wings and smaller size.

Entire occiput densely yellowish-grey-dusted, upper frontal orbits not as well distinguished as in most other species, paler dusted than remainder of frons except the lateral pale lines, the frons orange-yellow, darker centrally; face testaceous, with a brown mark in lower extremity of each fovea and another below these on the epistome; genæ and each side of prelabrum browned. Antennæ and palpi orange-yellow, third segment of former slightly darkened above. Frons at vertex fully one-third of the head-width, widened centrally and slightly narrowed in front, the surface hairs short and yellow; vertex with only the outer pair of bristles present. Face slightly depressed near middle in profile; antennæ about two-thirds the length of face, third segment about five times as long as wide; arista with hairs on basal fourth or less, the longest of which are almost as long as width of third antennal segment, male without apical palette; parafacial over half as wide as third antennal segment gena about one-fifth as high as eye, with a definite vertical central ridge.

Thorax black, dull, densely yellow-dusted on three broad mesonotal vittæ and on centre of scutellum, the pleura also densely yellow-dusted, without distinct vittæ, blackened on upper edge of mesopleura and along the longitudinal central suture, pleural hairs almost all yellow, as are those on scutellum and on the hind margin of mesonotum. Bristles as in *minor* except that there are no setulæ surrounding the posterior notopleural, the humeral and notopleural bristles are comparatively longer and stronger, the scutellum has an additional anterior pair of higher placed bristles, and the prescutellar pair of acrostichal bristles is absent.

Legs tawny yellow, coxæ, apical third or more of all femora below, apices of all tibiæ, and apical three segments of all tarsi black or dark brown. Armature as in *minor*.

Wings (Pl. I. fig. 1) yellowish hyaline, with dark brown markings. Fifth vein bare above and below, fourth vein sloping forward on apical section.

Abdomen brownish black, with a broad dorsocentral golden-yellow-dusted vitta from base to apex and the sides less densely yellow-dusted. Apices of tergites with quite strong fulvous-yellow bristly hairs, the shorter surface hairs darker, especially on the black vittæ.

Length 7·8–8·5 mm.

Type, male, Guadalcanal: Kaukau, 20. viii. 1934; allotype, Guadalcanal, 29. iv. 1934; paratype, male, topotypical, 18. ix. 1931. All taken by R. A. Lever.

I have before me a species from the Philippines that closely resembles *insulicola*, having the thorax and abdomen marked similarly and the tegulæ extending forward to base of the posterior notopleural bristle. But in it the abdomen has the apical tergal armature consisting of lanceolate scales and not setulæ, and there are many small lanceolate yellow scales on the fifth tergite in the female. The scutellum is damaged, so that I cannot determine the exact nature of the armature.

Euprosopia depressifrons, sp. n.

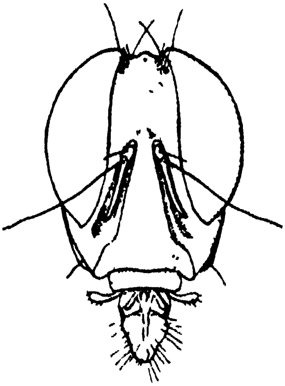
Male and *female*.—The largest species known to me from the Solomons, agreeing with *insulicola* in general colour and markings, differing from it in the much greater height as compared with the width of the head, the much narrower and more depressed vertex, and the black instead of yellow central mesonotal vitta.

Head orange-yellow, occiput and posterior half of genæ golden-yellow- or brassy-dusted, the short upper orbits shiny and apparently undusted, the extreme lateral edges of the frons whitish-dusted, as are also the parafacials posteriorly; face with a black streak in lower part of each fovea that is carried downward to the epistome, gena brown in centre; antennæ with the third segment browned on upper edge; palpi orange-yellow. Frons at vertex in male not much wider than third antennal segment and depressed well below upper level of eyes, the outer bristles short and strong, the inner pair much weaker and forwardly directed; in female the width of the frons at vertex is also depressed, but it is at least twice as wide as the third antennal segment, and the bristling is stronger, the inner pair being incurved and almost erect as usual; in both sexes the frons is widened to anterior margin, where it is about one-third as wide as head at that level. Height of head from in front in male about 1·75 times its central width (text-fig. 3), in female about 1·25 times that width. Face almost vertical ; gena about one-third as high as eye, central ridge present but weak.

Antenna about half as long as face ; aristæ with short hairs on basal fourth or less, the longest hairs about half as long as width of third antennal segment, no palette in male.

Thorax black, slightly shiny, the mesonotum densely golden-yellow-dusted, the disc with three broad black vittæ, the sides also blackened, the discal vittæ carried over scutellum but not entirely to its apex ; pleura yellow-dusted but not vittate. Bristling as in *minor*, but the posterior notopleural in the female is usually upcurved because of the prolongation forward of the tegulæ, the supra-alar is sometimes duplicated, and the six bristles on the posterior margin of the mesonotum are not in a straight transverse line, the acrostichals being a little proximad of the dorsocentrals, as are also the posterior postalars. The scutellum is also more convex than usual and regularly rounded behind, with the hairs black except round apex, and six strong bristles, the anteriorly pair rather highly placed.

Fig. 3.



Euprosopia depressifrons Mall. Head of ♂ trom in front.

Legs tawny yellow, fore coxæ browned, tarsi blackened from near apex of first segment to tips. Fore femur with some fine widely spaced curved hairs on the posteroventral surface ; fore tarsi slightly flattened.

Wings (Pl. I. fig. 2) yellowish hyaline, with fuscous markings. Costa slightly widened near base, with a bristle below at break; fifth vein bare above and below. Tegulæ brown in male, orange-yellow in female, but slightly produced forward, almost triangular in male, but in female much produced forward, extending to base of the posterior notopleural bristle, finger-like, with numerous short black curled hairs on apical half, the posterior edge with a series of bristles, partly black partly yellow. Squamæ dark grey, edges brown. Halteres yellow.

Abdomen black, with dense golden-yellow dust on a dorsocentral vitta and yellow-dusted on sides of tergites, no lateral dust in female. Hairs on yellow parts pale, on black parts dark brown. Venter of male with long dense golden-yellow hairs on third and fourth segments.

Length 11–14 mm.

Type, male, Tulagi, 1. xi. 1933, Dr. N. Cricklow (*H. T. Pagden*); allotype, topotypical, hospital, 13. viii. 1933 (*H. T. Pagden*); paratypes, one male, topotypical, ridge, on fæces, 12. viii. 1933 (*H. T. Pagden*); 2 females, Russell Island; 2 females, Guadalcanal, 14. xii. 1934 and 19. v. 1936; 1 female, Tulagi, 20. vii. 1936, and one male without date (*R. A. Lever*). Nine specimens.

It may be noted here that there is a small orange-yellow knob-like protuberance on the pleura below the centre of each tegula in all specimens that is not in the other species.

Family **Phytalmidæ.**

This group is a difficult one to place in our present system of classification, possessing as it does several confusing characters. The possession of genal processes or thorns is not confined to this group, there being similar departures from normal form in Otitidæ and Trypetidæ, and usually the feature is met with in only the males. The general habitus of the insects is similar to that of certain Calobatidæ, and also to that of the more slender members of the Platystominæ. The genital characters in both sexes approach those of the Otitidæ and Trypetidæ, the tube-like genital cone of the females being quite similar to the general form of that organ in several genera in both families. In one section of Phytalmidæ there are no anterior incurved orbital bristles, while in the other there is a pair of very fine hair-like bristles. These bristles are lacking in Otitidæ and present in Trypetidæ, so that the present family appears to weaken the value of the character for the separation of these families. The lack of an abrupt forward curvature at the apex of the subcostal cell would link the family with Otitidæ rather than with Trypetidæ, and possibly it should be considered as merely a subfamily of the former. As this paper is merely regional there appears to be no necessity to discuss the family relationships at greater length.

I have received a large amount of material from Mr. Frank H. Taylor and the British Museum in addition to that from the Solomon Islands, but having undertaken to report on the former in a paper on the New Guinea fauna it is deemed proper to deal with only the genera of the family and the species from the Solomons in this paper.

Below I present a key to the genera now known to me.

Key to the Genera.

1. Scutellum with a pair of long divergent finger-like processes at the apex of each of which there is a fine bristle; fore femur in neither sex with ventral bristles; at most only the posterior notopleural present, then represented by a fine hair situated on the extreme lateral edge near the wing-base, and curving upward; suture at hind margin of the mesopleura extending straight downward well below upper edge of central portion of the sternopleura; mesopleural bristle lacking; no anterior incurved orbital bristles present .... 2.

Scutellum with at most a pair of fine bristles at apex; fore femur of the male almost invariably with a few ventral bristles near middle, that of the female unarmed, posterior notopleural bristle strong; anterior (outer) postalar well developed; suture at hind margin of the mesopleura not extending below upper edge of the centre of sternopleura; mesopleural bristle frequently present; a pair of very fine incurved anterior orbitals present .... 4.

2. Anterior margin of the pronotum with three finger-like processes, the central one with

two bristles at its apex; vertex with two moderately strong bristles .... *Angituloides* Hendel.

Anterior margin of the pronotum simple ... 3.

3. Vertex without well-developed bristles; both sexes with two short pointed tubercles at base above and a more or less noticeably centrally divided elevation or hump near middle of abdominal petiole, most conspicuous in the male; inner cross-vein of the wing at or a little before middle of the discal cell .... *Angitula* Walker.

Vertex with two well-developed bristles; no pointed tubercles at base and at most a slight convexity at middle of abdominal petiole; inner cross-vein of the wing much beyond middle of the discal cell .... *Giraffomyia* Sharp.

4. First, second, and third wing-veins very close together, the width between the costa and third vein at level of the inner cross-vein in female rarely over half as great as length of that cross-vein; first vein ending in the costa far beyond level of inner cross-vein; fourth vein much dipped down before inner cross-vein; first posterior cell narrowed at apex; costa in male thickened beyond middle; supra-alar bristle present . *Diplochorda* Osten-Sacken.

First, second, and third wing-veins not exceptional in position, width between costa and third vein at level of inner cross-vein distinctly greater than length of the cross-vein; first vein ending in the costa at about the level of inner cross-vein; fourth vein almost straight before inner cross-vein; first posterior cell slightly widened at apex; costa in male not thickened near middle; supra-alar bristle lacking or represented by a weak short hair .... *Phytalmia* Gerstaecker.

ANGITULOIDES Hendel.

Zeitschr. wiss. Insektenbiol. Bd. ix. Heft 11, p. 345 (1913).

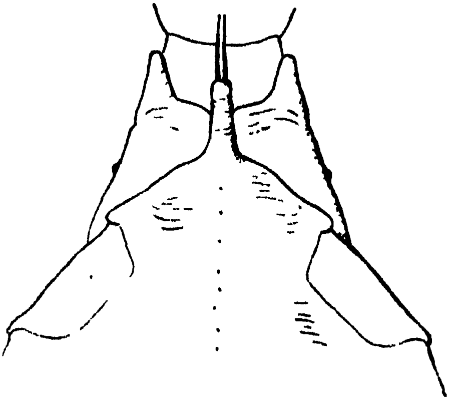
The peculiar anterior edge of the pronotum in this genus separates it readily from *Angitula*, but there is an approach to the same structure in one or two extralimital species of *Phytalmia*. There is but one described species of the genus, known from only the Solomon Islands.

Angituloides austeni Hendel.

Op. cit.

A metallic-blue species, with the head and legs largely fulvous-yellow. Frons usually with a brown line on each orbit curving inward and meeting at ocelli, and a brown line from posterior upper edge of each eye to posterior edge of metacephalon. Arista pubescent basally, in male with an apical palette. Anterior edge of pronotum in both sexes with three processes as in text-fig. 4. Mesonotum smooth and glossy. Posterior notopleural moderately long and strong. The mid- and hind coxæ are blackened, the apices of the fore and mid-tarsi and all of hind tibiæ are browned. Mid-tibia with a short, straight, apical ventral bristle; hind trochanter in male with a small ventral tubercle. Wings glassy, the costa with a black streak from humeral cross-vein, except in the costal cell, to apex of fourth vein that does not extend over third vein except at tip, both the cross-veins unclouded. Inner cross-vein at one-third from apex of discal cell, vein closing anal cell sloping outward below, the cell at apex about twice as wide as posterior basal cell at same point.

Fig. 4.



Angituloides austeni Hend.
Anterior part of pronotum, dorsal view.

British Solomons: S. Isabel, Pele, 29. ii. 1934, 500–700 feet, and 10. vii. 1935. Guadalcanal: Popanu, 500 feet, 15. xii. 1934. San Cristoval. Malaita: Su'u jungle, 16. viii. 1934 (*H. T. Pagden*). Eleven specimens, all except one taken by R. A. Lever.

Originally described from a female specimen taken by Woodford, the property of the British Museum.

Giraffomyia Sharp.

Zoological Results, based on material from New Britain, etc., part iv. p. 391, Cambridge (1900).

This genus was described from a single species that, according to its author, was rather variable in the degree of development of the genal thorns, and was distinguished from any other known to science by the geniculation of the bases of these structures. No specimen before me has a basal geniculation of the genal processes. The prolongation of the prothorax and the backward extension of the head are more marked in the genotype than in any species known to me.

I provisionally refer to this genus three apparently new species from the Solomons.

Key to the Species.

1. Genal processes longer than width of the head. 2.

Genal processes lacking or very short .... 3.

2. Genal processes geniculate near bases; fore coxæ not as long as distance from its anterior edge at base to anterior edge of the pronotum in profile; wing with a black costal stripe from base to apex extending to third vein, round tip to apex of fourth, and connected with a narrow black streak on inner cross-vein; apices of mid- and hind femora rather broadly and of mid- and hind tibiæ more narrowly blackened .... ***willeyi*** **Sharp.**

Genal processes geniculate at about their apical third, white at tips: wing as in *willeyi*; all femora and tibiæ fulvous-yellow. ***regularis*** **var.** ***perfecta*****, n. var.**

Genal processes not geniculate; fore coxæ about twice as long as distance from anterior edge at base to anterior edge of the pronotum in profile; wing with the costal stripe and streak over the inner cross-vein brown, the outer cross-vein with a faint brown cloud on lower extremity; mid- and hind femora and tibiæ entirely fulvous-yellow .... ***solomonensis*****, sp. n.**

3. Genal processes present, about as large as third antennal segment; sides of the pronotum broadly yellow; basal (composite) abdominal tergite evenly and gradually widened from base to apex, with but a faint indication of a central transverse depression. ***regularis*****, sp. n.**

Genal processes lacking; sides of pronotum very narrowly yellow; basal (composite) abdominal tergite very conspicuously constricted at middle .... ***irregularis*****, sp. n.**

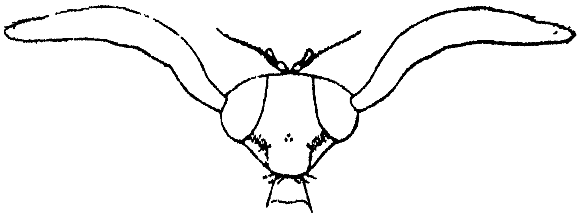
Giraffomyia willeyi Sharp.

Op. cit. p. 392.

This species was described from two males, though several other specimens of both sexes were doubtfully considered to belong to it. Both the males had the genal processes long and distinctly geniculate at their bases. The general colour is glossy brassy green, the head pallid beneath the antennæ, behind of a tawny orange-yellow colour, with the vertex fuscescent. The surface of the thorax is very polished and free from pubescence, but "there are punctures on the dorsal aspect of the thorax and some transverse wrinkles on the mesonotum." The other characters may in the main be gleaned from the foregoing key to the species.

Originally described from New Britain and possibly not to be found in the Solomons.

Fig. 5.



Giraffomyia solomonensis Mall. Dorsal view of head of ♂.

Giraffomyia solomonensis, sp. n.

Male and *female*.—Glossy blue-black, with a greenish tinge, head, legs, and ventral surface of prothorax bright orange-yellow, wings brownish hyaline, with a fuscous costal streak, and dark clouds below apex of subcostal vein and on both cross-veins.

Male.—Head with black dot on the closely placed ocelli and a black streak on the metacephalon from the inner upper corner of each eye to hind edge that is widest in front, the genal processes browned on anterior half or more to well beyond middle. Dorsal view of head as text-fig. 5; epistomo but slightly produced, rounded in outline, genal processes entering outline of eye on its lower third or more. Ocelli small and very closely placed, the width across posterior pair about one-fifth as great as distance of lateral ocellus from eye; vertex with two strong erect bristles that are a little nearer to ocelli than to eye; upper orbits short but distinct, each with a fine short hair instead of the usual bristle, and the lower lateral part of frons with some fine hairs; ocellars minute and hair-like. Arista with very short hairs above and below. Palpi short and slender, about as long as the third antennal segment, with some stiff black hairs. Posterior edge of the metacephalon with about six erect black bristles. Genal processes strap-like, hollowed out below, convex above, the apical fourth or less with some short black hairs above.

Pronotum forming a short neck, its anterior edge with a broad central rounded emargination, projecting well proximad of the small anteriorly tapered prosternal plate. Mesonotum smooth on a moderately wide central line, with transverse striæ on a stripe each side of the latter, most evident in front of the transverse suture which latter extends from side to side just proximad of the wing-bases, bending forward centrally, the posterior wider part of mesonotum a little longer than the anterior half; the only bristles evident are the posterior notopleural and anterior postalar, both of them very small and inconspicuous; one or two fine erect hairs on the pteropleura. Scutellum with the usual two long slender thorns at apex of each of which there is a single short bristle.

Legs slender, femora longer than tibiæ, tarsi, except the fore pair, shorter than their tibiæ and blackened apically, mid- and hind coxæ black. Mid-coxæ each with two appressed short black bristles forming a single stiff downwardly directed thorn; mid-tibia with an apical ventral straight spur.

Costal dark stripe darkest in stigma and rom a little before apex of second to apex of fourth vein (Pl. I. fig. 8). Inner cross-vein longer than distance from its upper extremity to costa, situated at almost one-third from apex of the discal cell; third and fourth veins both bent down apically, parallel on their apical sections; vein closing anal cell slightly bent outward or arched; free part of anal vein not as long as cross-vein. Halteres brown.

Abdomen rather thickly petiolate, the composite basal tergite as long as remainder of abdomen, slightly constricted before middle, with no basal lateral processes and with a few microscopic dark hairs on basal angles, the surface and that of all the other tergites entirely smooth and glossy, outline of dorsum of abdomen from constriction of basal tergite to apex elongate-oval, third tergite longer than fourth, fourth and fifth subequal, third and fourth with a few minute black apical hairs, fifth with some depressed black hairs on apical half and a few stronger setulose hairs or weak bristles at apex. Hypopygium small, closely pressed against the venter, with some fine dark short hairs. Sternites elongate and quite narrow.

Female.—Similar to the male in general colouring and structure, lacking the genal processes, and with the eyes entire, the anterior margin of pronotum more elevated, mid-coxa with one or two fine hairs, the wing-markings not as pronounced, and the genital cone flat and about as long as the preceding segment of abdomen.

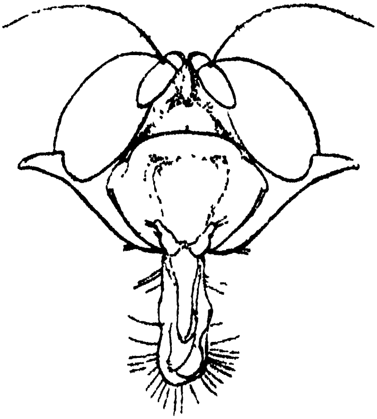
Length 11–14 mm.

Type, male, Guadalcanal, Oreke, 700 feet, 13. xii. 1934. Allotype, one wing missing, Ulawa, 19. v. 1934. Paratypes, Guadalcanal, Mauronia, 15. viii. 1934; Lavoro, in jungle, 17. ii. 1934; Doma, 8. xii. 1934, three specimens; Kaukau, 22. viii. 1934; Ulawa, 29. v. 1934; Vella Lavella, Parasso, 22. v. 1934; Guadalcanal, no locality, February, 1932; all by R. A. Lever. Eleven specimens in all.

Giraffomyia regularis, sp. n.

Male.—A smaller species than the one just described, with much the same general colour and structure, differing in the following particulars:—Genal processes small, about as long as the third antennal segment, flat, and rounded at apices (text-fig. 6), the emargination of the eye not extending above lower fourth; frons with a brown streak along each side; mesonotum more regularly and extensively striate, the scutellum not glossy and smooth but microscopically shagreened or granulose and with a bronzy or greenish tinge on sides, and slightly flattened; sides of the pronotum broadly orange-yellow; wings not as well marked, the costal dark streak pale brown; mid-coxæ with one rather strong and one much weaker apical bristle; abdomen quite regularly oval in dorsal outline, the basal composite tergite longer than the remainder of the tergites, without a central constriction, fifth tergite longer than the fourth, with only a few apical black setulose hairs. In the only specimen before me the bristle at the apex of each of the scutellar processes is distinctly longer than the latter, while in all the specimens of *solomonensis* that have the bristles present they are distinctly shorter than the processes. The hairs on the knobs of the halteres are much less evident in this species than in the other.

Fig. 6.



Giraffomyia regularis Mall. Head of ♂, frontal view.

Length 9 mm.

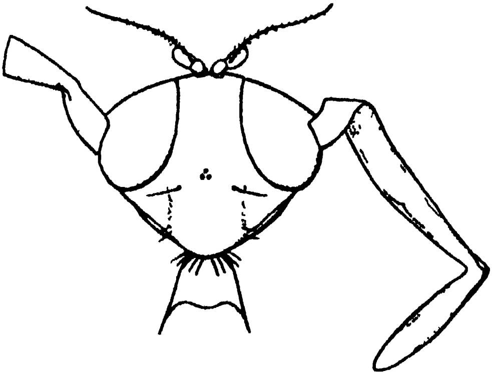
Type, Ugi, 6. v. 1934 (*R. A. Lever*).

Giraffomyia regularis var. *perfecta*, n. var.

Male.—Similar in general colour and structure to the typical form, but the type is teneral, so that it is difficult to make a close comparison. The principal distinction lies in the presence of a pair of long genal processes, the one that is intact on the type being fully as long as the head and thorax combined, more slender than in *solomonensis*, pale yellow in colour except its tip which is white, there being an evident weak part or geniculation a little beyond its apical third which may or may not be normal in the species (text-fig. 7). There are no hairs on the processes such as occur in *solomonensis*. The scutellum is damaged in the type, but is apparently the same in structure and sculpture to the typical form, and the apical bristles on the processes are longer than the latter. The abdomen is shrunken, but the structure appears to be as in the typical form.

Length 9·5 mm.

Fig. 7.



Giraffomyia regularis var. *perfecta* Mall. Genal process of ♂.

Type, Ugi, 6. v. 1934 (*R. A. Lever*). Both types have an inked label-number " 2641."

Despite the difference in the structure of the genal processes of these two insects I believe the specimens represent merely extreme forms of a single species.

Giraffomyia irregularis, sp. n.

Male.—A metallic-blue species, with the head orange-yellow and marked with black as in the other species, the legs orange-yellow, mid- and hind coxæ black, extreme apices of mid- and hind femora, all of mid- and hind tibiæ and tarsi, and apices of fore tarsi dark brown ; wings slightly brown-tinged, with a black-brown costal stripe that extends almost to the fourth vein in basal half of the anterior basal cell, and to third vein on the remainder of its extent to near its apex, where it runs obliquely across tip of first posterior cell, ending on apex of fourth vein ; inner cross-vein conspicuously bordered with dark brown, the cloud connected with the costal stripe, cross-vein at base of discal cell very slightly brown-clouded, outer cross-vein not clouded (Pl. I. fig. 9).

Genal process entirely lacking, the gena narrower than usual and more or less darkened, the margin of the eye entire, aristæ a little longer haired than in the other species.

Mesonotum rather more coarsely transversely striate than in the others, the scutellum flattened, almost transverse between the apical processes, the surface rather dull and granulose, the apical bristles shorter than the processes.

Legs as in *solomonensis*, but the mid-coxæ have only one or two setulose hairs at apices instead of a pair of short stout bristles.

Free part of anal vein over half as long as the vein closing anal cell.

Abdomen with the basal composite segment conspicuously constricted at or close to middle, the general structure as in *solomonensis*.

Length 9 mm.

Type, S. Mala, Supaina, 20. v. 1934 (*R. A. Lever*).

EXPLANATION OF PLATE I.

Fig. 1. Wing of ***Euprosopia insulicola*** **Mall.**
Fig. 2. Wing of ***Euprosopia depressifrons*** **Mall.**
Fig. 3. Wing of ***Euprosopia alticeps*** **Mall.**
Fig. 4. Wing of ***Euprosopia minor*** **Mall.**
Fig. 5. Wing of ***Euprosopia connexa*** **Mall.**
Fig. 6. Wing of ***Elassogaster marginalis*** **Mall.**
Fig. 7. Wing of ***Elassogaster nigripes*** **Mall**
Fig. 8. Wing of ***Giraffomyia solomonensis*** **Mall.**
Fig. 9. Wing of ***Giraffomyia irregularis*** **Mall.**
Fig. 10. Wing of ***Rivellia fulvescens*** **Mall.**

VII.—*Notes on the Nomenclature of Fossil Fishes.*—Part II. *Homonyms D–L.* By Errol I. White, D.Sc., British Museum (Natural History), and J. A. Moy-Thomas, M.A., Department of Zoology and Comparative Anatomy, Oxford.

In the first part (Ann. & Mag. Nat. Hist. (11) v. p. 502 (1940)) we published notes on the homonyms A–C, corresponding with the first part of Dr. S. A. Neave's 'Nomenclator Zoologicus' (Zool. Soc. London, 1939):

in this we deal with those beginning D–L, corresponding to the second part of Dr. Neave's work, published later in the same year.

Dictyaspis Kiaer, 1932, ***non*** Haeckel, 1887 (Prot.), is identical with *Irregulareaspis* Zych, 1931, according to Heintz (*in litt.*), *Dictyaspidella* Strand, 1934, is another synonym.

Dinaspis Kiaer, 1932, ***non*** Leonardi, 1911 (Col.), has been renamed *Dinaspidella* by Strand, 1934 (Fol. Zool. Hydrobiol., Riga, v. p. 327).

Diplodus Agassiz, 1843, ***non*** Rafinesque, 1810 (Pisces), is a synonym of *Pleuracanthus* Agassiz, 1837, ***non*** Gray, 1832, *Orthacanthus* Agassiz, 1843, and many others—see Woodward, 1889, p. 2 *.

Diplolepis Vetter, 1881, ***non*** Geoffroy, 1762 (Hym.), ***nec*** Fabricius, 1805 (Hym.), *nec* Steindachner, 1863 (Pisces), is a synonym of *Sauropsis* Agassiz, 1832, *teste* Woodward, 1895, p. 375.

Dipristis Marsh. 1870 (1869), ***non*** Gervais, 1869 (Pisces), is a synonym of *Edaphodon* Buckland, 1838, *teste* Woodward, 1891, p. 73.

Eoscorpius Jordan & Gilbert, 1919, Publ. Stanford Univ.—Fossil Fishes S. California, p. 53, ***non*** Meek & Worthen, 1868, Amer. J. Sci. (2) xlvi. p. 25 (Arachn.), is renamed **Aneoscorpius,** nom. nov.

Euacanthus Trautschold, 1884, Bull. Soc. Imp. Nat. Moscou, lviii. (1883) pt. ii. p. 171, ***non*** Burmeister, 1839, Handb. Entom. ii. p. 116 (Hem.), *nec* Philippi, 1857 (Crust.) is renamed **Margaritacanthus,** nom. nov.

Eugnathus Agassiz, 1844, ***non*** Schoenherr, 1833 (Col.), must be replaced by *Furo* Gistl, 1848.

Eulepidotus Egerton, 1868, ***non*** Herrich-Schaeffer, 1850–6 (Lep.), like *Heterolepidotus* Egerton, 1872, is a synonym of *Brachyichthys* Winkler, 1861, *teste* Woodward, 1895, p. 304.

Eurygnathus Davis, 1887, ***non*** Wollaston, 1854 (Col.), is a synonym of *Enchodus* Agassiz, 1835, *teste* Woodward, 1901, p. 190.

Eurylepis Newberry, 1858, ***non*** Blyth, 1854 (Rept.), must be replaced by *Haplolepis* Miller, 1892.

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* For methods of reference, see part I. *supra.*

Eurynotus Agassiz, 1835, *non* Kirby, 1817 (Col.), must be spelt *Eurynothus* (Agassiz), 1844, Poiss. foss. i. p. 175), or *Notacmon* Gistl, 1848, will have to be used, since *Plectrolepis* Agassiz, 1835, was a *nomen nudum* until validated by Egerton in 1850.

Eurystethus Sauvage, 1878, *non* Mayr, 1864 (Hem.), is based on a fragmentary specimen not certainly distinguishable from *Pachythrissops* Woodward, 1919.

Galeodes Heckel, 1854, *non* Olivier, 1791 (Arachn.), *nec* Bolten, 1798 (Moll.), is a synonym of *Galeocerdo* Müller & Henle, 1837, *teste* Woodward, 1889, p. 443.

Gastrodus Owen, 1867, *non* MacLeary, 1826 (Col.), is a synonym of *Rhizodopsis* Young, 1866, *teste* Woodward, 1891, p. 354.

Glaucolepis Stensiö, 1921, *non* Braun, 1917 (Lep.), must be replaced by *Pteronisculus* White, 1933.

Glossodus M'Coy, 1848, Ann. & Mag. Nat. Hist. (2) ii. p. 127, *non* Agassiz, 1829, in Spix, Piscium Brasil. p. 48 (Pisces), is renamed **Euglossodus,** nom. nov.

Glossodus Costa, 1851 (1853), *non* M'Coy, 1848 (Pisces), *nec* Agassiz, 1828 (Pisces), is a synonym of *Cœlodus* Heckel, 1856, *teste* Woodward, 1895, p. 249.

Glyptocephalus Agassiz, 1844, *non* Gottsche, 1835 (Pisces), is a synonym of *Bucklandium* König, 1825, *teste* Woodward, 1901, p. 570.

Glyptognathus Newberry, 1889, *non* Lydekker, 1882 (Amphib.), was proposed to separate an American species of *Glyptopomus* Agassiz, 1844, from the typical forms on grounds not yet established, and need not be replaced.

Gomphodus Pander, 1856, *non* Reuss, 1846 (Pisces), was given to a supposed Cœlolepid scale, later considered to be Acanthodian. The name is not now used in a strictly generic sense, but as the name of a type of scale ("Schuppentypus"—Hoppe, 1931, Palæontographica, lxxvi. p. 81), and is not worth replacing, especially as other names will eventually prove available.

Goniobatis Le Hon, 1871, *non* Agassiz, 1858, is a synonym of *Ætobatis* Müller & Henle, 1841 (=*Aëtobatus* Blainville, 1816), *teste* Woodward, 1889, p. 127.

Goniodus Newberry, 1889, *non* Agassiz, 1838 (Pisces), *nec* Dunker, 1848 (Moll.), has been replaced by *Xenodus* Miller, 1892.

Graphiurus Kner, 1886, *non* Cuvier, 1829 (Mamm.), has been replaced by *Graphiurichthys* White & Moy-Thomas, 1937 (Geol. Mag. lxxiv. p. 286).

Harpactes Egerton, 1876, *non* Swainson, 1833 (Aves), *nec* Templeton, 1834 (Arachn.), *nec* Dahlbom, 1844 (Hymen.), *nec* Agassiz, 1846 (Crust.), *nec* Ménétriés, 1848 (Col.), and *Harpactira* Egerton, 1876, *non* Ausserer, 1871, are synonyms of *Osteorachis* Egerton, 1868, *teste* Woodward, 1895, p. 324.

Harpactira Egerton, 1876.—See *Harpactes* Egerton, 1876.

Hemicyclus Geinitz, 1868, *non* Westwood, 1841 (Col.), was based on indeterminable Teleost scales, *teste* Woodward, 1901, p. 59, and need not be replaced.

Hemirhynchus Agassiz, 1844, *non* Hodgson, 1843 (Aves), must be replaced by *Homorhynchus* Van Beneden, 1873.

Heterolepis Costa, 1865, *non* Fitzinger, 1845 (Rept.), *nec* Smith, 1847 (Rept.), was based on indeterminable fish-scales, *teste* Woodward, 1901, p. 612, and need not be replaced.

Heterostichus Wagner, 1860, *non* Girard, 1854 (Pisces), has been replaced by *Heterostrophus* Wagner (1859), 1863.

Histiurus Costa, 1850, *non* Wiegmann, 1834 (Rept.), has been replaced by *Diplomystus* Cope, 1877.

Holodus Pander, 1858, Ctenodipt. devon. Syst. p. 38, *non* Agassiz, 1845, Nom. Zool. (Pisces-add.), p. 3 is renamed **Holodipterus,** nom. nov. In the 'Nomenclator Zoologicus' Agassiz's name is given as a *nomen nudum*, but it is validated by the author's statement that it equals *Notidanus* Cuvier, 1817.

Homacanthus Eichwald, 1860, appears to be identical with *Homacanthus* Agassiz, 1845, *teste* Woodward, 1891, p. 105.

Homalasips Kiaer, *non* Reinhard, 1860 (Hymen.), *nec* Milne-Edwards, 1863 (Crust.), *nec* Brunner, 1895 (Orth.), has been named *Homalaspidella* Strand, 1934 (Fol. Zool. Hydrobiol., Riga, v. p. 327), and *Homaspis* Kiaer & Heintz, 1935.

Ismene Boghacev, 1936, *non* Savigny, 1816 (Lep.), *nec* Swainson, 1820 (Lep.), *nec* Stephens, 1834 (Lep.), *nec* Nickerl, 1846 (Lep), is a subgenus of *Prolebias* Sauvage, 1874, of doubtful validity.

Isodus Heckel, 1849, *non* M'Coy, 1848 (Pisces), is a synonym of *Enchodus* Agassiz, 1835, *teste* Woodward, 1901, p. 190.

Isomma Jordan, 1927, Stanford Univ. Publ., Biol. Ser. v. ii. p. 10, *non* Selys, 1892, Ann. Soc. ent. Belgique, xxxvi. p. 104 (Odonata), is renamed **Anisomma,** nom. nov.

Laugia Stensiö, 1932, Medd Grønland, lxxxiii. iii. p. 46, we do not consider to be invalidated by *Laugia* of Kirby, 1892, Synon. Cat. Lep. Heteroc. i. p. 705 (Lep.), which is a mere typographic error for *Langia* Moore, 1872.

Leioderma Stensiö, 1918, *non* Willemoes-Suhm, 1873 (Verm.), *nec* Tryon, 1882 (Moll.), *nec* Stafford, 1904 (Verm.), has been renamed *Wimania* Stensiö, 1921.

Leiolepis Goldenberg, 1875, *non* Cuvier, 1829 (Rept.), *nec* Duméril, 1853 (Rept.), is a synonym of *Amblypterus* Agassiz, 1833, *teste* Woodward, 1891, p. 437.

Lepidopterus Pohlig, 1892, Festschr. 70ten Geburtst. R. Leuckarts, p. 63, *non* Agassiz, 1846, Nomen. Zool. Index Univ. p. 205 (Pisces), is renamed **Westollia** (see Westoll, 1937, Ann. & Mag. Nat. Hist. (10) xix. pp. 573–4).

Lepidotus Agassiz, 1833, *non* Asso, 1801 (Pisces), must be replaced by *Lepidotes* Agassiz, 1832. The synonym *Lepidosaurus* Meyer, 1830. Isis, xxiii. p. 518, was a *nomen nudum*, without proper generic characters, figures or species—see Woodward, 1895, pp. 77, 102.

Leptaspis Gross, 1933, Abh. preuss. geol. Landesanst. (N.F.) cxlv. p. 62, *non* Bleeker, 1850, Verh. Batav. Genoot. xxiv. (1852), no. 5, pp. 17, 18, 71 (Pisces), is renamed **Euleptaspis,** nom. nov.

Leptosomus v. d. Marck, 1863, Palæontogr. xi. p. 49; *non* Vieillot, 1816, Analyse, p. 28 (Aves), *nec* Schoenherr, 1823 (Col.), *nec* Agassiz, 1846 (Pisces), is renamed **Cassandra,** nom. nov.

Leptotrachelus v. d. Marck, 1863, Palæontogr. xi. 59; *non* Latreille, 1829, in Cuvier's 'Regne Animal,' 2nd edit. iv. p. 371 (Col.), is renamed **Benthesikyme,** nom. nov.; for *Triænaspis* Cope, 1878, given as a synonym by Woodward, 1901, p. 173, is considered by Hay (1903, Bull. Amer. Mus. N.H. xix. p. 89) to be a distinct genus.

Lewisia Davis, 1887, *non* Chitty, 1857 (Moll.), is a synonym of *Spaniodon* Pictet, 1850, *teste* Woodward, 1901, p. 48.

Liognathus Newberry, 1873, Geol. Surv. Ohio, Rep. I. ii. p. 306, *non* Agassiz, 1846, Nomen. Zool. Index Univ. p. 212;

(Pisces), was replaced by *Lispognathus* Miller, 1892, N. Amer. Geol Pal. p. 716, *non* Milne-Edwards, 1880, Miss. Mex. Rech. Zool. v. pt. 8, p. 349 (Crust.). It appears as a synonym of *Coccosteus* Agassiz, 1844, in Woodward, 1891, p. 278, but according to Hussakoff, 1906, Mem. Amer. Mus. N.H. ix. p. 140, it is a distinct genus, and therefore requires a new name, for which we propose **Woodwardosteus,** nom. nov.

Lispognathus Miller, 1892, *non* Milne-Edwards, 1880 (Crust.)—see *Liognathus* Newberry.

Lissolepis Davis, 1884, *non* Peters, 1872 (Rept.), is a synonym of *Eugnathus* Agassiz, 1844, *teste* Woodward, 1895, p. 286.

Lobodus Costa, 1866, *non* Morris & Roberts, 1862 (Pisces), was applied to indeterminable Sparoid teeth, *teste* Woodward, 1901, p. 537, and need not be replaced.

Lophaspis Brotzen, 1934, *non* Redtenbacher, 1895 (Orth.), was applied to fragments of Heterostraci and need not be replaced.

Lophodus Romanowsky, 1864, *non* Symonds, 1861 (Pisces), is a synonym of *Psephodus* (Agassiz MS.) Morris & Roberts, 1862, *teste* Woodward, 1889, p. 176.

Lophodus Newberry & Worthen, 1870, *non* Symonds, 1861 (Pisces), *nec* Romanowsky, 1864 (Pisces), is a synonym of *Campodus* de Koninck, 1844, *teste* Woodward, 1889, p. 238.

Lopholepis Pander, 1856, *non* Hagenow, 1851 (Bryozoa), referred to indeterminable fragments of uncertain affinities, *teste* Woodward, 1891, p. 156, and need not be replaced.

VIII.—*The Lice of Petrels.*—Part III. *The Genus* Pelmatocerandra. By Gordon B. Thompson.

[Plate II.]

In the two previous contributions toward a study of the petrel lice I have listed the species described to date and given some general notes on the various groups of species. This, the third paper in the series, deals with the monotypic genus *Pelmatocerandra*. Unfortunately, owing to lack of certain specimens, I shall be compelled to deal with the various groups in an order which will be controlled by the amount of material available. As many drawings and photographs of whole insects as are possible will be used, thus dispensing with the wearisome task of giving lengthy descriptions. It is to be hoped that the identity of at least the greater number of the known species may be settled in this series of papers for all times.

Genus PELMATOCERANDRA Enderlein.

Pelmatocerandra Enderlein, Deutsche Sudpolar-Expedition (1901–1903), 1909, Bd. x. Heft 4, p. 449.
Pelmatocerandra Harrison, 1916, Parasitology, ix. pp. 23, 144.
Pelmatocerandra Ewing, A Manual of External Parasites, 1929, p. 111.

The original description of the genus is as follows :—

"Antennen fünfgliedrig, verschieden in beiden Geschlechtern ; beim ♀ ist das 1 Glied kurz, beim ♂ sehr läng und nach hinten gebogen. 3. Glied des ♂ ohne Fortsatz. Meso- und Metathorax verschmolzen. Kopfoorderrand ziemlich flach, an den Seiten mit Ecken. Körperform lang und schmal. Labialpalpus eingliedrig. Maxillarpalpus fehlt."

The following is a translation of Enderlein's generic description :—

"Antennæ five-segmented—differing in both sexes ; in the female the first segment is short ; in the male the first segment is very long and bent backwards, third segment of male without a process. Meso-metathorax fused. Front margin of head somewhat flat, with angles at sides. Form of body long and narrow. Labial palpi one-segmented. Maxillary palpi wanting."

Enderlein added the following remark : "Distinguished from *Ricinus* Degeer (=*Nirmus* Nitzsch) by the sexual dimorphism of the antennæ."

The genus *Pelmatocerandra*, as originally described, was due to a misconception both of its author and of the author of the species upon which it was founded, but it is, nevertheless, as in the case of *Pseudonirmus*, a valid genus.

Pelmatocerandra setosa (Giebel). (Pl. II. ; text-figs. 1–10.)

Bibliography.

Nirmus setosus Giebel, Ann & Mag. Nat. Hist. 1876, (4) xvii. p. 388.
Nirmus setosus Giebel, Phil. Trans. roy. Soc. 1879, 168 (extra vol.), pp. 253–254, pl. xiv. fig. 18.
Nirmus setosus Giebel, Piaget, Les Pédiculines, Leiden, 1880, p. 205.

Nirmus setosus Giebel, Studer, Forschungsreise der Gazelle, 1899, Bd. iii. p. 125.

Nirmus setosus Giebel, Enderlein, Wiss. Ergebn. deutsch. Tiefsee-Expedition, 1903, Bd. iii. p. 236.

Nirmus setosus Giebel, Kellogg, Wytsman's Genera Insectorum, 1908, fasc. 66, p. 29.

Pelmatocerandra setosa (Giebel), Enderlein, Deutsche Sudpolar Expedition (1901–1903), Berlin, 1909, Bd. x. Heft 4, pp. 449–450, figs. 189–191.

Lipeurus eatoni Kellogg, Sci. Bull. Brooklyn Inst. 1914, ii. pp. 86–87.

Pelmatocerandra setosa (Giebel), Harrison, Parasitology, 1916, ix. p. 144.

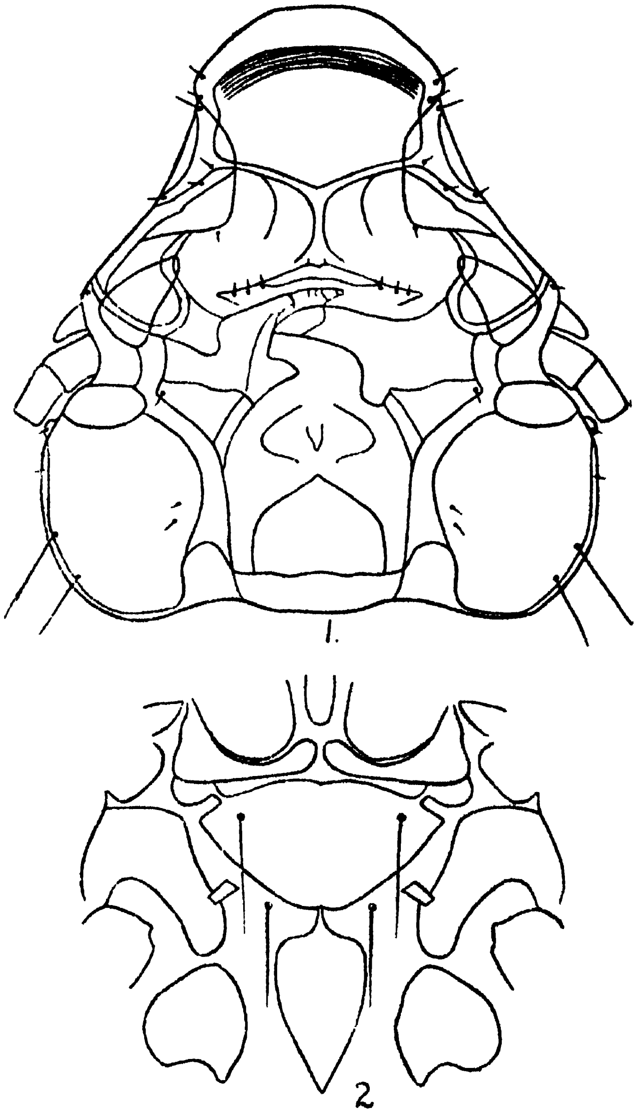
Type-host.—*Pelecanoides urinatrix* (Gmelin).

History of the Species.—This interesting species was first described briefly in Latin by Giebel (1876) on the basis of six specimens collected from *Pelecanoides urinatrix* at Kerguelen I., in 1874, by the English Transit of Venus Expedition. Three years later a more detailed description of the insect appeared in an extra volume of the 'Philosophical Transactions of the Royal Society' in English, having been translated from Giebel's German paper. In this paper Giebel's original Latin description was reproduced together with a general description of the species. The whole insect was figured, together with details of the first and third legs and the right side of the head. It seems fairly evident that Giebel's specimens, which consisted of six examples, two of which were immature, were all females. The lice were reported to have been found among the "white feathers of the breast and belly."

Piaget (1880), who apparently did not see specimens of the species, merely gave a brief description in French, together with measurements, and refers to Giebel's description of 1876.

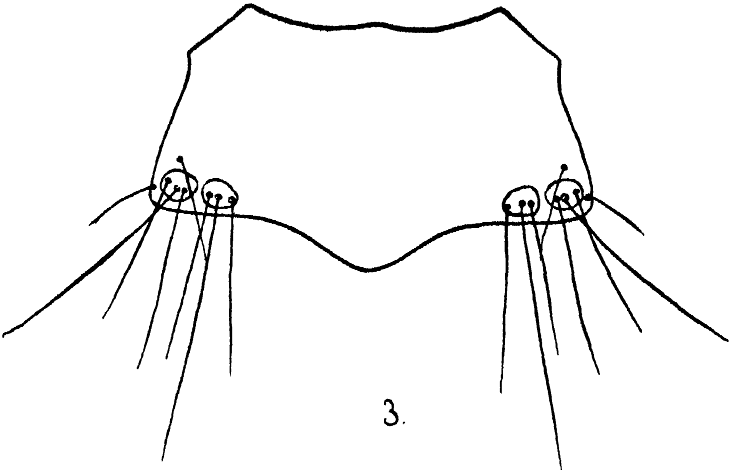
Studer (1899) merely listed the species, without any indication of the host. Enderlein (1903) listed the species and gave the host as *Pelecanoides urinatrix* in his contribution to the insects of Kerguelen I. in the reports on the German Deep-sea Expedition. Kellogg (1908) included the species in his list of the known species of Mallophaga.

Enderlein (1909) redescribed the species, and erected a new genus for it on the basis of a number of specimens collected by the German South Polar Expedition. All his specimens save one, which may be considered as a straggler (on *Pachyptila d. desolata* (Gmelin) (the host



Pelmatocerandra setosa (Giebel).

Fig. 1.—Head of ♀.
Fig. 2.—Thoracic sternites.



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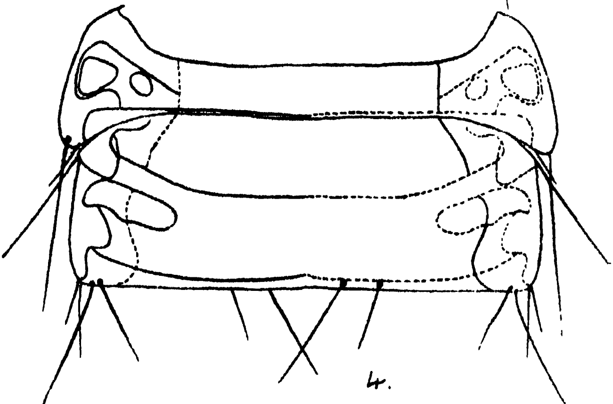

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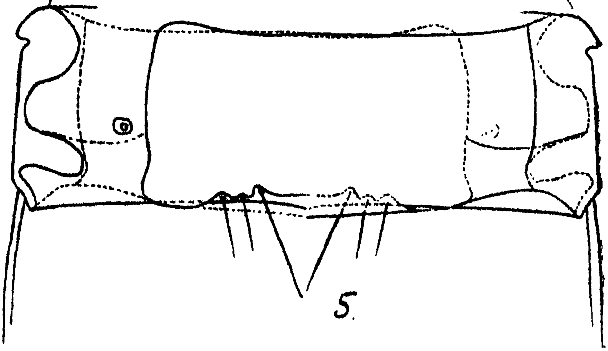

5.

Pelmatocerrandra setosa (Giebel).

Fig. 3.—Metathorax.
Fig. 4.—Fifth and sixth abdominal segments of ♂.
Fig. 5.—Sixth abdominal segment of ♀.

recorded by him)) were taken on the type-host. He figured the dorsal and ventral aspects of a male and the dorsal aspect of a female. His figures are not, however, particularly helpful.

Kellogg (1914) recorded two females and a male taken from *Pelecanoides urinatrix* at South Georgia I. and a single female from *Oceanodroma leucorhoa*, which may be regarded as a straggler. This author suggested that Giebel's specimens were probably all females, " which led him to describe the species as a *Nirmus* instead of assigning it to *Lipeurus*, where it certainly belongs, if no genus * is erected for it. The secondary sex differences of the antennæ are revealed by the male specimen now in my hands. But they are differences much less than shown by most Lipeuri, consisting only of an enlargement of the first (especially) and third segments, without the presence of a projecting process on either of them." Kellogg, after deciding to transfer the species to *Lipeurus*, proposed the unnecessary new name *eatoni*.

Harrison (1916) listed Giebel's species under Enderlein's genus *Pelmatocerandra*, with Kellogg's *eatoni* as a synonym.

Up to the present this genus appears to be monotypic, occurring only on species of the petrel genus *Pelecanoides*, *i. e.*, Diving Petrels, which breed in the Southern Hemisphere.

Generic Characters.—Small, stoutish forms ; head only a little longer than broad, with clypeal suture ; occipital blotches large and widely separated, the occiput flatly convex between them ; occipital bands strong ; temporal bands very narrow. Anterior half of head very distinctive. Signature approximately same shape as in *Philoceanus*, but anterior border bears crescentric rings ; gutta, lateral grooves, and marginal incrassations are absent. Characteristic of the genus are the elongated triangular blotches arising from a narrow base in front of the antennæ and running forward parallel to the antennal and frontal bands.

Specimens examined †.—5 ♀♀, 2 ♂♂, off *Pelecanoides u. urinatrix* (Gmelin), New Zealand.

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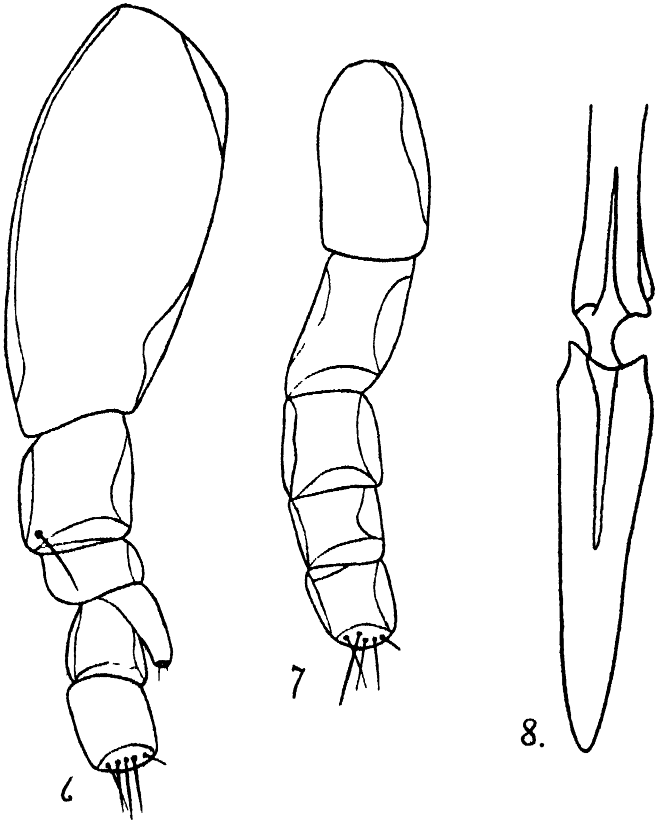
* Kellogg was apparently unaware of the publication of Enderlein's 1909 paper.

† I understand from Dr. S. Kéler that Giebel's original specimens are not contained in the Halle collection. In view of this I propose to make my specimens neotypes and neoparatypes as follows :—♀ and ♂ neotypes, and 4 ♀♀, 1 ♂ neoparatypes.

Description.—Medium stoutish forms, fairly strongly sclerotic and pigmented.

Female (Pl. II. ; text-figs. 1, 2, 3, 5, 7, 9).

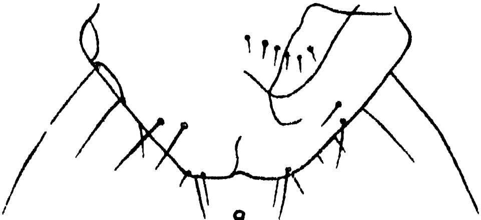
Head a little longer than broad. Antennal bands, ocular and occipital blotches well marked. Occipital blotches well spaced, with the occiput flatly convex between them. The elongated triangular blotches arising from a narrow base in front of the antennæ and running



Pelmatocerandra setosa (Giebel).

Fig. 6.—♂ antenna.
Fig. 7.—♀ antenna.
Fig. 8.—♂ genitalia.

forward parallel to the antennal and frontal bands are very characteristic (text-fig. 1). Clypeus rectangular, with a slight median swelling of the posterior margin and a series of crescentric rings anteriorly. Trabeculæ small, about half the length of the first antennal segment. Antennæ simple (see text-fig. 7), five-segmented; second segment about the same length as the first, third a little shorter than the fourth, together about the same length as the first segment; fifth segment about as long as the fourth. For the remainder of the head details see text-fig. 1.



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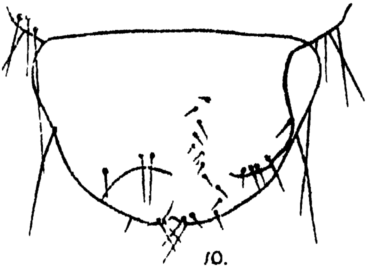


10.

Pelmatocerandra setosa (Giebel).
Fig. 9.—Terminal abdominal segment of ♀.
Fig. 10.—Terminal abdominal segment of ♂.

Prothorax small, about two and a half times broader than long; narrow anteriorly (being a little wider than the clypeus), expanding to its greatest width at about half its length. One small seta posterior to its widest point laterally and a slightly larger seta on the posterior margin at a little more than a fifth of its width.

Meso-metathorax (see text-fig. 3). For details of the thoracic sternites see text-fig. 2. Legs normal.

Abdomen a little more than twice as long as broad. Pleurites heavily chitinized and sclerotized. Tergites continuous, unicolorous except for a clear area surrounding the spiracles. Sternites rectangular in shape, separated from the pleurites by a clear area (see text-fig. 5). Terminal abdominal segments as in text-fig. 9.

Male.

A smaller, more slender form.

The head bears a row of four small setæ in a line parallel to the dorsal occipital bands between the œsophageal sclerites and those bands on the ventral side which appear to be absent in the female. Antennæ: first segment greatly enlarged, second small, third smaller, fourth, a little longer than the third, bears a process, fifth almost equal in length to the fourth. The second to fifth segments about equal in length to the first (see text-fig. 6).

Thorax similar to that of the female, except that there appears to be a few more setæ (c. 4·4) on the lateral margins of the prothorax (my specimens of the males are somewhat damaged and some of the hairs are missing).

Abdomen considerably more than twice as long as broad. Transverse bands distinct, well chitinized and sclerotized. For details of abdominal segments, terminal segments, and genitalia see text-figs. 4, 8, and 10.

Measurements (in mm.).

	♂.	♀.
Total length	2·1	3·1
Greatest breadth	0·5	0·7

EXPLANATION OF PLATE II.

Pelmatocerandra setosa (Giebel), ♀. × c. 27.

Postscript.—Since sending this paper to the press a few additional specimens have come to hand. Some more detailed notes as a result of further study are also available, but owing to the fact that I have been called up for war service I am compelled to leave the paper in its original state.—G. B. T.

IX.—*Twenty-four new Generic Names in Orthoptera.*

By B. P. Uvarov, D.Sc., British Museum (Natural History).

The present paper is a continuation of the two lists of new generic names in Orthoptera proposed to replace preoccupied ones and published in this journal (Ann. & Mag. Nat. Hist. ser. 11, vol. iii. 1939, pp. 457–459 ; vol. v. 1940, pp. 173–176). The list covers the names beginning with the letters M to P inclusive, and a fourth list covering the remaining letters will be published subsequently.

Macella Stål, 1875 (Phasmidæ), preoccupied by *Macella* Walker, 1858 (Lepidoptera), re-named **Macellina**, n. n.

Martinella I. Bolivar, 1909 (Acrididæ), is preoccupied by *Martinella* Jousseaume, 1887 (Mollusca), and by *Martinella* Sicard, 1907 (Coleoptera), but no new name is required since I am able to establish that *Platypternella pictifemur* Salfi, 1928, is a pure synonym of *Martinella cretacea* I. Bolivar, 1914 (*syn. nov.*), and the generic name becomes *Platypternella* Salfi.

Megacanthopus Chopard, 1929 (Mantidæ), preoccupied by *Megacanthopus* Ducke, 1904 (Hymenoptera), re-named **Macracanthopus**,, n. n.

Mekongia Uvarov, 1925 (Acrididæ), preoccupied by *Mekongia* Crosse & Fischer, 1876 (Mollusca), re-named **Mekongiana**, n. n.

Metaplasia Ramme, 1931 (Tettigoniidæ), preoccupied by *Metaplasia* Hall & Clarke, 1894 (Brachiopoda), but a new name *Metaplastes* Ramme has been already proposed (Mitt. Zool. Mus. Berlin, vol. xxiv. 1939, p. 507).

Metriotes Westwood, 1859 (Phasmidæ), preoccupied by *Metriotes* Herrich-Schaeffer (Lepidoptera), re-named **Metriophasma**, n. n.

Micropteryx Stephens, 1835 (Tettigoniidæ), is preoccupied by *Micropteryx* Agassiz, 1831 (Pisces), but a later synonym, *Pholidoptera* Wesmall, 1838, is available and used for the genus.

Mitrariella Hebard, 1929 (Tetrigidæ), preoccupied by *Mitrariella* Willemse, 1928 (Tetrigidæ), but already re-named *Indomitraria* Tinkham, 1939 (Lingnan Sci. Journal, xviii. p. 463).

Monopterus Fischer-Waldheim, 1846 (Acrididæ), is preoccupied by *Monopterus* Lacepède, 1800 (Pisces), but no new name is required, since a later name for Fischer's genus is *Podismopsis* Zubovsky, 1900. The synonymy *Monopterus gracilis* Fischer-Waldheim, 1846 = *Podismopsis altaica* Zubovsky, 1900 (*syn. nov.*), has been tentatively suggested by Jacobson (Priamokr. Lozhn. Ross. Imp. p. 315), but ignored by subsequent authors, while in my opinion it is beyond doubt. Thus, the name of the species should be *Podismopsis gracilis* (F.-W. 1846).

Mortonia Fritze, 1908 (Tettigoniidæ), preoccupied by *Mortonia* Gray, 1852 (Echinodermata), re-named **Aulocrania,** n. n.

Myrmegryllus Chopard, 1928 (Gryllidæ), preoccupied by *Myrmegryllus* Filbrig, 1907 (Gryllidæ), re-named **Myrmophilellus**, n. n.

Neanthes Stål, 1875 (Phasmidæ), is preoccupied by *Neanthes* Kinberg, 1865 (Vermes), but no new name is required since the genus is synonymous with *Asprenas* Stal, 1875.

Necaxa Hebard, 1932 (Acrididæ), is preoccupied by *Necaxa* Baker, 1928 (Mollusca), but a new name *Necaxacris* has already been proposed by Roberts (Ent. News, l. 1939, p. 160).

Neocles Stål, 1875 (Phasmidæ), preoccupied by *Neocles* Chapuis, 1874 (Coleoptera), re-named **Neoclides**, n. n.

Nephele I. Bolivar, 1887 (Tetrigidæ), is preoccupied by *Nephele* Huebner, 1819 (Leptidopera), and two new names were proposed for it, *Phelene* I. Bolivar and *Gladiotettix* Hancock. Both names date from 1906, but Bolivar's *Phelene* appeared in the July part of the Bol. Soc. Esp. Hist. Nat., received in the British Museum on November 6th, while *Gladiotettix* was published in a part of 'Genera Insectorum,' the manuscript of which was dated 15th July (see p. 79), and which itself reached the British Museum on November 10th. I believe, therefore, that the following synonymy is correct: *Phelene* I. Bolivar, 1906 (= *Gladiotettix* Hancock, 1906, syn. nov.).

Oniscosoma Brunner, 1865 (Blattidæ), is preoccupied by *Oniscosoma* Sars, 1850 (Vermes), but no new name is required since a recognised synonym, *Laxta* Walker, 1868, is available for the genus.

Opharus I. Bolivar, 1917 (Acrididæ), preoccupied by *Opharus* Walker, 1855 (Lepidoptera), re-named **Opharicus**, n. n.

Orchamus I. Bolivar, 1906 (Tettigoniidæ), was a name proposed to replace the preoccupied *Orchesticus* Saussure, but is itself preoccupied by *Orchamus* Stal, 1876 (Acrididæ); no new name, however, is required, since the name *Stipator* Rehn, 1900, has been proposed earlier to replace *Orchesticus* Saussure.

Orobia Stål, 1875 (Phasmidæ), preoccupied by *Orobia* Martus, 1860 (Mollusca), re-named **Leiophasma**, n. n.

Orophila Krauss, 1892 (Tettigoniidæ), preoccupied by *Orophila* Staudinger, 1886 (Lepidoptera), re-named **Canariola**, n. n.

Oxyophthalmus Saussure, 1862 (Mantidæ), is preoccupied by *Oxyophthalmus* Hochhuth, 1847 (Coleoptera), but no new name is required since the genus has also been called *Oxyophthalma* Saussure, 1869, and this should be considered a synonym now becoming valid.

Oxyprora Brunner, 1878 (Tettigoniidæ), is preoccupied by *Oxyprora* Stal, 1873 (Tettigoniidæ), and the names *Oxyprorella* Giglio-Tos, 1898, and *Oxypita* I. Bolivar, 1906, have been proposed to replace it; the following synonymy therefore, must be established: *Oxyprorella* Giglio-Tos, 1898 (= *Oxypita* I. Bolivar, 1906, *syn. nov.*).

Pachycarus Uvarov, 1921 (Acrididæ), is preoccupied by *Pachycarus* Solier, 1835 (Coleoptera), but no new name is required since the genus is synonymous with *Pseudogmothela* Karny, 1910 (see Uvarov, Ann. S. Afric. Mus. xxix. 1929, p. 43).

Pachytrachelus Fieber, 1853 (Tettigoniidæ), preoccupied by *Pachytrachelus* Chaudoir, 1852 (Coleoptera), re-named **Pachytrachis**, n n.

Pallasiella Kirby, 1910 (Acrididæ), is preoccupied by *Pallasiella* Sars, 1895 (Crustacea), but no new name is required since the genus is synonymous with *Ramburiella* I. Bolivar, 1906.

Pappus Saussure, 1884 (Acrididæ), preoccupied by *Pappus* Distant, 1884 (Hemiptera), re-named **Pappacris**, n. n.

Parabacillus Schulthers, 1910 (Phasmidæ), preoccupied by *Parabacillus* Caudell, 1903 (Phasmidæ), re-named **Xylobacillus**, n. n.

Paradanuria Wood-Mason, 1877 (Mantidæ, Toxoderinæ), is preoccupied by *Paradanuria* Saussure, 1871 (Mantidæ, Thespinæ), although the latter name was a synonym of *Parathespis* Saussure, 1869 (*syn. nov.*) from the beginning, since it has been proposed, in a footnote, as an alternative for the valid *Parathespis*. Wood-Mason's genus is renamed **Toxodanuria**, n. n.

Paraduronia Karny, 1910 (Acrididæ), is preoccupied by *Paraduronia* I. Bolivar, 1909 (Acrididæ), but no new name is required, since Karny's genus is synonymous with *Prostethophyma* I. Bolivar, 1909 (see Uvarov, Ann. S. Afric. Mus. xxix. 1929, p. 45).

Parysatis Stål, 1874 (Tettigoniidæ), is preoccupied by *Parysatis* Thomson, 1868 (Coleoptera), and two names were proposed almost simultaneously to replace it, viz., *Parysatia* I. Bolivar, in a paper published in July and received in the British Museum on November 6th, 1906, and *Roxelana* Kirby, published in the Catalogue, the preface to which has been signed on November 12th, 1906. The following synonymy should be, therefore, recorded: *Parysatia* I. Bolivar, 1906 (=*Roxelana* Kirby, 1906; *syn. nov.*).

Peloria Redtenbacher, 1908 (Phasmidæ), preoccupied by *Peloria* Cocco, 1844 (Pisces), re-named **Peloriana**, n. n.

Peltastes Fischer-Waldheim, 1839 (Tettigoniidæ), is preoccupied by *Peltastes* Illiger, 1807 (Hymenoptera), but a synonym *Psorodonotus* Brunner, 1861, is used for the genus.

Perisceles Redtenbacher, 1908 (Phasmidæ), preoccupied by *Perisceles* Wright & Studer, 1887 (Cœlenterata), re-named **Prosceles**, n. n.

Phæstus I. Bolivar, 1887 (Tettigidæ), preoccupied by *Phæstus* Förster, 1868 (Hymenoptera), re-named **Phæsticus**, n. n.

Philection Chopard, 1924 (Blattidæ), preoccupied by *Philection* Wasmann, 1894 (Coleoptera), re-named **Philodontomacha**, n. n. This opportunity for a change is welcome, since the original name has been given to denote biological connection between the cockroach and the ant, which has been at first reported as *Eciton*, but actually proved to be *Odontomachus* (*cf.* Chopard, Bull. Soc. Ent. France, 1924, pp. 131, 186).

Phrynotettix Saussure, 1884 (Acrididæ), is preoccupied by *Phrynotettix* Glover, 1872 (Acrididæ), but the genus is considered synonymous with *Tristira* Brunner, 1900, which name is used for it (Kirby, Syn. Cat. Orth. iii. p. 211).

Pirithous I. Bolivar, 1918 (Acrididæ), preoccupied by *Pirithous* Keyserling, 1883 (Arachnida), re-named **Piritholeus**, n. n.

Platydactylus Brullé, 1835 (Gryllidæ), is preoccupied by *Platydactylus* Goldfuss, 1820 (Reptilia), but a synonym *Eneoptera* Burmeister, 1838, is used for the genus.

Platymorpha Redtenbacher, 1906 (Phasmidæ), preoccupied by *Platymorpha* Jacoby, 1888 (Coleoptera), re-named **Platyphasma**, n. n.

Platypterna Fieber, 1853 (Acrididæ), is preoccupied by *Platypterna* Hitchcock, 1848 (Reptilia), but *Ochrilidia* Stål, 1873, regarded by me as a pure synonym of *Platypterna* (see Soc. Ent. Fr., Livre du Centen., 1932, p. 285), is available for the genus.

Platystolus Finot, 1896 (Tettigoniidæ), is preoccupied by *Platystolus* I. Bolivar, 1878 (Tettigoniidæ), but Finot's genus is known to be synonymous with *Præphippigera* I. Bolivar, 1903, and no new name is required.

Plegmatoptera Karsch, 1889 (Tettigoniidæ), preoccupied by *Plegmatoptera* Spinola, 1839 (Hemiptera), re-named **Plegmatia**, n. n.

Plicigera Uvarov, 1923 (Tettigoniidæ), preoccupied by *Plicigera* Bittner, 1890 (Brachiopoda), re-named **Plicigastra**, n. n.

Pœcilotettix I. Bolivar, 1902 (Tetrigidæ), preoccupied by *Pœcilotettix* Scudder, 1897 (Acrididæ), but a synonym *Deltonotus* Hancock, 1904, is available and used for the genus.

Primnoa Fischer-Waldheim, 1846 (Acrididæ), is a name proposed by Motschoulsky *in litteris* for a genus later described by him as *Prumna* Motschoulsky, 1859; Fischer, while not recognising the validity of *Primnoa*, nevertheless used the name and accompanied it with the indication of the genotype as well as with a clear description, thus making himself the author of the genus *Primnoa* F.-W., of which *Prumna* Motsch. is a pure synonym (*syn. nov.*).

Pristes Redtenbacher, 1895 (Tettigoniidæ), preoccupied by *Pristes* Carpenter, 1864 (Mollusca), re-named **Pristonotus**, n. n.

Pronemobius I. Bolivar, 1898 (Gryllidæ), is preoccupied by *Pronemobius* Scudder, 1890 (fossil Gryllidæ), but the genus was based on *Nemobius sylvestris* F., and is therefore synonymous with *Nemobius* Serville, 1839, and so are *Pantelinus* I. Bolivar, 1921, and *Heteronemobius* Krauss, 1909 (*synn. nova*), which two names were proposed to substitute *Pronemobius*.

Prorachthes Gersbaecker, 1889 (Acrididæ), preoccupied by *Prorachthes* Loew, 1868 (Diptera), re-named **Proracris**, n. n.

Pseudochæta Kirby, 1904 (Mantidæ), is preoccupied by *Pseudochæta* Coquillet, 1895 (Diptera), but the genus is synonymous with *Stenovates* Saussure, 1872.

Psyra Stål, 1876 (Tettigoniidæ), preoccupied by *Psyra* Walker, 1860 (Lepidoptera), re-named **Psyrana**, n. n.

Pternoscirtus Saussure, 1884 (Acrididæ), was proposed in a key to genera (Mem. Soc. Phys. Hist. Nat. Genève, xxviii. no. 9, p. 59), but on p. 192 of the same paper the author substituted *Conipoda* Saussure, 1884, for it, apparently because of the uncomfortable resemblance to *Pternoscirta* Saussure, already used on p. 52. Unfortunately, there is no alternative but to establish the synonymy: *Pternoscirtus* Saussure, 1884 (=*Conipoda* Saussure, 1884, *syn. nov.*).

Pusa Uvarov, 1921 (Acrididæ), preoccupied by *Pusa* Oken, 1816, and *Pusa* Scopoli, 1877 (both Mammalia), re-named **Pusana**, n. n.

X.—*Descriptions of new Species of* Limacodidæ.

By R. J. West.

[Plate III.]

(Published by permission of the Trustees of the British Museum.)

The descriptions in this paper are based on material in the collection of the British Museum (Natural History).

Phlebodicha cardinalli, sp. n. (Pl. III. fig. 21.)

Male.—Palpus raw sienna. Antenna finely serrate. Head. frons mineral-red, vertex raw sienna. Thorax dark mineral-red. Abdomen raw sienna above and beneath. Pectus raw sienna. Legs raw sienna suffused with mineral-red. Fore wing raw sienna lightly suffused with mineral-red; a dark mineral-red patch on lower half at base; a smaller mineral-red patch on upper angle of cell; a suffusion of mineral-red forming a downcurved line from apex into patch on lower half; fringe raw sienna. Hind wing raw sienna. Underside: fore and hind wings raw sienna lightly suffused with mineral-red on proximal half.

Expanse 21 mm. (tip to tip 19 mm.).

Holotype (♂), paratypes, 6 ♂♂. Gold Coast, N. Territories, Kete Krachi (*A. W. Cardinall*).

Nearest ally *P. secunda* Strand.

Cosuma flavimacula, sp. n. (Pl. III. fig. 14.)

Male.—Palpus amber-brown, fuscous above. Antenna fuscous, pectinate. Head: frons and vertex straw-yellow tinged with amber-brown. Thorax straw-yellow. Abdomen straw-yellow tinged with amber-brown above and beneath. Pectus and legs straw-yellow tinged with amber-brown. Fore wing tawny-olive, veins fuscous, an elliptical straw-yellow patch below cell between veins 1 and 1 *a*, with a smaller straw-yellow spot beneath, a small patch of raised scales on discocellulars. Hind wing straw-yellow, veins fuscous. Underside: fore and hind wings straw-yellow, veins fuscous.

Expanse 40 mm. (tip to tip 38 mm.).

Holotype (♂). Tanganyika Territory.

Nearest ally *C. polana* Druce.

Tryphax incurvata, sp. n. (Pl. III. fig. 1.)

Male.—Palpus army-brown, fuscous above. Antenna pectinate, army-brown, a tuft of white scales at base. Head: frons army-brown, vertex vinaceous buff. Thorax: Patagium vinaceous buff, tegula hair-like scales vinaceous buff to army-brown at tips. Abdomen vinaceous buff suffused with army-brown, venter vinaceous buff. Pectus vinaceous buff. Legs: fore leg vinaceous suffused with army-brown; mid and hind legs vinaceous buff suffused with army-brown on tarsi. Fore wing vinaceous buff sparsely irrorated with blackish brown; an oblique, broken line composed of clusters of army-brown and blackish-brown scales, from costa near apex to inner margin at about one-third; subterminal fascia an army-brown line, incurved from costa to vein 5, angled and incurved to tornus; fringe army-brown. Hind wing vinaceous buff. Underside: fore and hind wings vinaceous buff lightly tinged with army-brown.

Expanse 30 mm. (tip to tip 28 mm.).

Holotype (♂). Nyasaland, Mlangi, Luchenya River, 2. i. 1913 (*S. A. Neave*).

Nearest ally *T. cinerea* Holl.

Macroplectra cinnamomea, sp. n. (Pl. III. fig. 20.)

Male.—Palpus pinkish cinnamon. Antenna pectinate. Head: frons and vertex pinkish cinnamon. Thorax pinkish cinnamon. Abdomen pinkish buff tinged with cinnamon, venter pinkish buff. Pectus pinkish buff. Legs pinkish cinnamon suffused with fuscous. Fore wing pinkish cinnamon; a wavy, slightly arched fuscous line from apical area to inner margin at one-half. Hind wing pinkish buff. Underside: fore wing pinkish buff suffused with fuscous in cell; hind wing pinkish buff.

Expanse 20 mm. (tip to tip 18 mm.).

Holotype (♂), 15. vii. 1920. Paratypes, 2 ♂♂, 12 & 13. vii. 1920, Uganda, Mabira Forest (*E. A. Dummer*); 1 ♂, Uganda, Basukiba, 15. x. 1901 (*C. S. Betton*).

Nearest ally *M. mesocyma* Hamps.

Macroplectra bilineata, sp. n. (Pl. III. fig. 17.)

Male.—Palpus snuff-brown suffused with fuscous. Antenna pectinate for two-thirds, a tuft of snuff-brown scales at base. Head: frons snuff-brown; vertex snuff-brown scales forming a tuft tipped with whitish, projecting between antennæ. Thorax: patagium snuff-brown; tegula and rest of thorax drab. Abdomen drab above and beneath. Pectus drab. Legs fuscous, drab on segmental joints of tarsi. Fore wing drab irrorated with fuscous; subterminally two fuscous black wavy lines; area beyond snuff-brown, interneural fuscous black dots on termen. Hind wing drab tinged with fuscous. Underside: fore wing drab tinged with fuscous; hind wing drab.

Expanse 14 mm. (tip to tip 13 mm.).

Holotype (♂). Gold Coast. Bibianaha, 700 ft., v. 1912 (*H. G. F. Spurrell*).

Macroplectra flavata, sp. n. (Pl. III. fig. 3.)

Male.—Palpus antimony-yellow. Antenna pectinate for four-fifths. Head: frons and vertex antimony-yellow. Thorax: patagium antimony-yellow; tegula and rest of thorax light buff. Abdomen light buff, anal tuft antimony-yellow; venter antimony-yellow. Fore wing light buff suffused with antimony-yellow; postmedial fascia, a fine oblique line, antimony-yellow proximally, light buff distally, from costa at two-thirds to inner margin at one-third; subterminal fascia similar to postmedial in colour, from costa just before apex to inner margin near tornus; fringe antimony-yellow. Hind wing light buff, fringe tinged with antimony-yellow. Underside: fore wing fuscous, fringe antimony-yellow; hind wing light buff tinged with antimony-yellow.

Expanse 15 mm. (tip to tip 14 mm.).

Holotype (♂). Nyasaland, Maiwale (*Dr. W. A. Lamborn*).

Nearest ally *M. rufopallens* Hamps.

Stroteroides albitibiata, sp. n. (Pl. III. fig. 18.)

Male.—Palpus cinnamon-buff, warm sepia at base. Antenna pectinate, a tuft of light buff scales at base. Head: frons cinnamon-buff, vertex warm sepia. Thorax and abdomen warm sepia, anal tuft light buff. Pectus and legs warm sepia, a patch of white scales at each end of fore tibia; segmental joints on all legs light buff. Fore and hind wings warm sepia. Underside similar to upperside.

Expanse 24 mm. (tip to tip 22 mm.).

Holotype (♂). S. Nigeria, Ilesha (*L. E. H. Humfrey*).

Nearest ally *S. nigrisignata* Strand.

Narosa albescens, sp. n. (Pl. III. fig. 4.)

Female.—Palpus white. Antenna simple, a tuft of white scales at base. Head: frons and vertex white

Thorax and abdomen white. Pectus and legs white. Fore wing white with three light drab ill-defined wavy bands, antemedially, postmedially and subterminally; a light drab patch on termen at apex, another between veins 2 and 4. Hind wing white. Underside: fore wing white, suffused with light drab below costa, light drab on termen at apex; hind wing white.

Expanse 24 mm. (tip to tip 21 mm.).

Holotype (♀). N. Nigeria, Minna, 7. x. 1910 (*Scott Macfie*).

Nearest ally *N. trilinea* Beth.-Baker.

Narosa irrorata, sp. n. (Pl. III. fig. 5.)

Female.—Palpus white. Antenna simple, white tuft at base. Head: frons and vertex white. Thorax and abdomen white. Pectus and legs white. Fore wing white; three streaks in basal area, on costa, median nervure and inner margin, consisting of fuscous irrorations; three wavy fasciæ, antemedial, medial and postmedial, also composed of fuscous irrorations: subterminal fascia a wide band of wood-brown irrorated with fuscous on lower half, from costa near apex to tornus. Hind wing white tinged with fuscous on veins, a fuscous spot on discocellulars. Underside: fore wing white suffused with fuscous, wood-brown near apex; hind wing white, wood-brown on costa and termen, fuscous spot on discocellulars.

Expanse 16 mm. (tip to tip 15 mm.).

Holotype (♀). Gold Coast, Bibianaha, 23. x.–2. xi. 1911 (*H. G. F. Spurrell*)

Nearest ally *N. trilinea* Beth.-Baker.

Altha basalis, sp. n. (Pl. III. fig. 16.)

Male.—Palpus antimony-yellow suffused with Verona-brown. Antenna pectinate, Verona-brown tuft at base. Head: frons antimony-yellow tinged with Verona-brown; vertex antimony-yellow. Thorax: patagium antimony-yellow; tegula antimony-yellow suffused with Verona-brown, a small patch of white scales posteriorly. Abdomen antimony-yellow suffused with Verona-brown above and beneath. Pectus antimony-yellow. Legs antimony-yellow, Verona-brown on femora. Fore wing Verona-brown; sub-basal area a suffused patch of warm sepia, divided and sharply outlined by a warm sepia line on distal edge, bordered by antimony-yellow distally, from costa at one-third to vein 2, angled and inwardly oblique to base of inner margin; postmedial fascia a suffusion of warm sepia; subterminally an excurved series of fuscous black dots on veins; fringe warm sepia. Hind wing pinkish buff tinged with Verona-brown, fringe edged with warm sepia. Underside: fore and hind wings pinkish buff tinged with Verona-brown, fringe edged with warm sepia.

Expanse 24 mm. (tip to tip 22 mm.).

Holotype (♂). Congo Free State, Lufira Valley, xi.–xii. 1918. Paratypes, 2 ♂♂, 30. xi. 1918, 10. i. 1919, Lufira River, near Likasi Cop Mt., 4000 ft. (*T. A. Barns*); 1 ♂, Tanganyika, Songea, 3000 ft., 30. i. 1933 (*R. F. Johnstone*).

Nearest ally *A. rubrifusalis* Hamps.

Delorachis kilosa, sp. n. (Pl. III. fig. 9.)

Male.—Palpus antimony-yellow tinged with testaceous. Antenna pectinate for one-fourth. Head: frons antimony-yellow; vertex antimony-yellow tinged with testaceous. Thorax testaceous. Abdomen antimony-yellow above and beneath. Pectus antimony-yellow. Legs antimony-yellow suffused with testaceous, claws Mars-violet. Fore wing testaceous, veins on distal half Mars-violet; on inner margin at about one-half, a small triangular-shaped patch of Veronese-green edged with Mars-violet, apex reaching vein 1. Hind wing pinkish buff suffused with antimony-yellow, more intensely on inner margin. Underside: fore wing pinkish buff suffused with testaceous; hind wing similar to upperside.

Expanse 25 mm. (tip to tip 23 mm.).

Holotype (♂), 16. xii. 1925. Paratypes, 2 ♂♂, 16. xii., 19. xii. 1925, Tanganyika Territory, Kilosa (*N. C. Miller*).

Nearest ally *D. nigrivenosa* Karsch.

Delorachis kitale, sp. n. (Pl. III. fig. 10.)

Male.—Palpus antimony-yellow suffused with testaceous. Antenna pectinate for one-fifth. Head: frons and vertex antimony-yellow suffused with testaceous. Thorax: patagium testaceous; tegula testaceous with elongate Veronese-green spot in centre; a Veronese-green spot on thorax between tegulæ. Abdomen antimony-yellow above and beneath. Pectus antimony-yellow. Legs antimony-yellow fringed with testaceous hairs, claws Mars-violet. Fore wing testaceous, veins on distal half Mars-violet; a Veronese-green patch on inner margin at one-half, proximal edge oblique, distal edge excurved and outlined with Mars-violet. Hind wing antimony-yellow slightly tinged with testaceous on distal half. Underside: fore and hind wings testaceous, costa and veins antimony-yellow.

Expanse 30 mm. (tip to tip 29 mm.)

Holotype (♂). Kenya, Kitale, 1. iv. 1936 (*G. W. Jeffrey*).

Nearest ally *D. viridiplaga* Karsch.

Parasa costalis, sp. n. (Pl. III. fig. 11.)

Male.—Palpus Mars-violet. Antenna pectinate one-fifth, remainder serrate. Head: frons Mars-violet; vertex chartreuse-yellow. Thorax: patagium chartreuse-yellow; tegula chartreuse-yellow, edged laterally with Mars-violet. Abdomen antimony-yellow, anal tuft and venter Mars-violet. Pectus Mars-violet. Legs antimony-yellow, Mars-violet hairs on tibiæ and tarsi. Fore wing Mars-violet, costa chartreuse-yellow; a chartreuse-yellow patch below lower angle of cell, distal edge straight to inner margin, proximal edge downcurved to inner margin at base. Hind wing antimony-yellow. Underside: fore wing Mars-violet, antimony-yellow on costa; area between cell and inner margin antimony-yellow; hind wing antimony-yellow.

Expanse 43 mm. (tip to tip 39 mm.).

♀ similar to ♂, but antenna simple, and chartreuse-yellow patch on inner margin of fore wing is produced to a fine tapering point, reaching up to vein 6.

Expanse 48 mm. (tip to tip 42 mm.).

Holotype (♂), 24. i. 1933. Allotype (♀), 19. xii. 1932, Tanganyika Territory, Songea, 3800 ft. (*R. F. Johnstone*).

Nearest ally *P. affinis* Mab.

Parasa divisa, sp. n. (Pl. III. fig. 15.)

Male.—Palpus army-brown. Antenna pectinate for one-fourth. Head: frons army-brown; vertex olive-yellow. Thorax: patagium army-brown; tegula olive-yellow bordered on outer side with dusky brown. Abdomen warm buff, dorsal suffusion and anal tuft dusky brown; venter warm buff. Pectus and legs army-brown. Fore wing army-brown suffused with dusky brown sub-basally, with ochraceous orange spot below cell; medially, an olive-yellow fascia, the proximal edge wavy and oblique, distal edge excurved from costa to vein 2, then excurved to inner margin; distal half of wing army-brown irrorated with dusky brown postmedially, suffused subterminally. Hind wing warm buff suffused with dusky brown subterminally. Underside: fore and hind wings warm buff suffused with army-brown on distal half.

Expanse 34 mm. (tip to tip 29 mm.).

Holotype (♂). Paratypes, 1 ♂, Gold Coast, Secondi; 1 ♂, French Guinea, Soundedou, near Macenta, 1600 ft., 12. v. 1926 (*C. L. Collenette*); 1 ♂, Belgian Congo, N.E. Stanleyville, Tshopo–Lindi Watershed, 1600 ft., iv. 1921 (*T. A. Barns*).

Nearest ally *P. latistriga* Walk.

Parasa cor, sp. n. (Pl. III. fig. 13.)

Male.—Palpus vinaceous fawn. Antenna pectinate for two-thirds. Head: frons vinaceous fawn; vertex olivine. Thorax olivine. Abdomen antimony-yellow, vinaceous fawn tuft at base; venter vinaceous fawn. Pectus vinaceous fawn. Legs vinaceous fawn tinged with dusky brown, antimony-yellow on tarsal segments. Fore wing olivine; basally a heart-shaped vinaceous fawn patch outlined with dusky brown; terminally a vinaceous fawn border with proximal edge outlined with dusky brown, wavy from costa to vein 4, then produced to three interneural points, then excurved to inner margin near tornus. Hind wing pinkish buff tinged with vinaceous fawn on distal half. Underside: fore wing antimony-yellow suffused with vinaceous fawn along costa and on termen; hind wing antimony-yellow suffused vinaceous fawn on termen, fringe tipped with brown at tornus.

Expanse 28 mm. (tip to tip 27 mm.).

Holotype (♂), S. Centr. Angola, Upper Cubango–Cunene Watershed, 5500 ft., x. 1928 (*T. A. Barns*). Paratype, ♂, Angola, S. Bihe District, Benguela Plateau, 5000 ft., xi. 1928 (*T. A. Barns*).

Nearest ally *P. infuscata* Wichgraf.

Parasa marginata, sp. n. (Pl. III. fig. 12.)

Male.—Palpus dusky brown. Antenna pectinate for one-third. Head: frons vinaceous fawn; vertex olivine. Thorax olivine. Abdomen antimony-yellow, vinaceous fawn at base; venter dusky-brown. Pectus dusky brown. Legs dusky brown, antimony-yellow on tarsal segments. Fore wing olivine; basally a vinaceous fawn patch outlined with dusky brown on distal edge, which zig-zags from costa at one-fifth to inner margin; terminally a vinaceous fawn border, the proximal edge outlined with dusky brown, outwardly bowed from costa to vein 4, forming two blunt points, then excurved to inner margin near tornus. Hind wing pinkish buff tinged with vinaceous fawn, fringe vinaceous fawn. Underside: fore wing antimony-yellow suffused with vinaceous fawn on costa and termen; hind wing antimony-yellow suffused with vinaceous on termen.

Expanse 34 mm. (tip to tip 32 mm.).

Holotype (♂). Paratypes, 2 ♂♂, S. Centr. Angola, Upper Cubango–Cunene Watershed, 5500 ft., x. 1928 (*T. A. Barns*).

Nearest ally *P. infuscata* Wichgraf.

Omocena songeana, sp. n. (Pl. III. fig. 8.)

Male.—Palpus vinaceous brown. Antenna pectinate on proximal half. Head: frons and vertex vinaceous brown. Thorax vinaceous brown, venter vinaceous buff. Pectus and legs vinaceous brown; white on lower joint of tibia and segmental joints of tarsi of fore leg; vinaceous buff on segmental joints of other legs. Fore wing vinaceous brown sparsely irrorated with blackish brown; a blackish-brown line, inwardly oblique, from costa just before apex to inner margin near base; a fine straight blackish-brown line in subterminal area, from costa just before apex to near tornus. Hind wing vinaceous buff tinged with vinaceous brown, blackish brown on fringe at tornus. Underside: fore and hind wings vinaceous buff tinged with vinaceous brown.

Expanse 24 mm. (tip to tip 21 mm.).

Holotype (♂), 19. i. 1933. Paratypes, 1 ♂, 20. i. 1933, Tanganyika Territory, Songes, 3800 ft. (*R. F. Johnstone*); 1 ♂, 5. xii. 1925, Pugi (*N. C. Miller*).

Nearest ally *O. convergens* Hering.

Omocena dollmani, sp. n. (Pl. III. fig. 2.)

Male.—Palpus tawny. Antenna serrate. Head: frons and vertex tawny. Thorax: patagium tawny; tegula light buff. Abdomen tawny above and beneath. Pectus and legs tawny, light buff on tarsi. Fore wing light buff suffused with fuscous along costa; sub-basally, a light suffusion of tawny below cell forming a triangular patch; postmedial fascia, formed by two tawny lines, inwardly oblique from costa near apex, to centre of inner margin; subterminal fascia an excurved fuscous band; fringe tawny. Hind wing light buff, fringe tawny. Underside: fore and hind wings light buff, fringe tawny.

Expanse 28 mm. (tip to tip 24 mm.).

Holotype (♂). N.W. Rhodesia (*H. C. Dollman*).

Nearest ally *O. micacea* Butl.

Niphadolepis griseicostalis, sp. n. (Pl. III. fig. 6.)

Female.—Palpus light ochraceous buff mixed with Mars-brown. Antenna simple. Head: frons and vertex light ochraceous buff. Thorax and abdomen light ochraceous buff. Pectus and legs light ochraceous buff, long cartridge-buff hairs on tibiæ and tarsi, mikado-brown on segmental joints of tarsi. Fore wing mikado-brown; sub-basal area irrorated with Mars-brown, defined by a Mars-brown line on distal edge, incurved from costa to median nervure, angled and inwardly oblique to inner margin; a wide drab grey suffusion on distal two-thirds of costa; a concentration of irrorations on termen at apex. Hind wing light ochraceous buff. Underside: fore wing light ochraceous buff, Mars-brown on costa and termen, mixed with cartridge-buff at apex; hind wing light ochraceous buff, Mars-brown on termen.

Expanse 34 mm. (tip to tip 32 mm.).

Holotype (♀). N.W. Rhodesia (*H. C. Dollman*).

Miresa livida, sp. n. (Pl. III. fig. 19.)

Male.—Palpus dark livid brown. Antenna pectinate for one-third. Head: frons and vertex dark livid brown. Thorax: patagium dark livid brown; tegula russet. Abdomen russet above and beneath. Pectus russet. Legs dark livid brown. Fore wing russet; postmedial fascia a yellow-green broken line, the upper portion in a suffusion of dark livid brown, excurved from costa at two-thirds to base of vein 5, after break continuing from median nervure to inner margin near base. Hind wing a uniform russet. Underside: fore and hind wings ochraceous buff suffused with russet.

Expanse 26 mm. (tip to tip 24 mm.).

Holotype (♂). Congo, N. of Lake Kivu, Nina Gongo, Birunga Volcanoes, 6000–8000 ft., iii. & iv. 1924 (*Mrs. T. A. Barns*).

Nearest ally *M. pyrosoma* Butl.

Natada caliginosa, sp. n. (Pl. III. fig. 7.)

Male.—Palpus mikado-brown tinged with fuscous. Antenna serrate. Head: frons and vertex mikado-brown. Thorax: patagium mikado-brown; tegula mikado-brown, light drab posteriorly. Abdomen mikado-brown, venter hair-brown. Pectus light drab. Legs mikado-brown. Fore wing light drab; two hair-brown spots, one on discocellulars, the other near base of vein 2; fringe hair-brown. Hind wing light drab. Underside: fore and hind wings light drab.

Expanse 28 mm. (tip to tip 26 mm.).

Holotype (♂), 1. i. 1926. Paratype, ♂, 2. ii. 1926, Tanganyika Territory, Kilosa (*N. C. Miller*).
Nearest ally *N. amicta* Swinh.

(Colours from Ridgway's 'Color Standards and Color Nomenclature,' 1912.)

EXPLANATION OF PLATE III.

Fig. 1. *Tryphax incurvata*, sp. n.
Fig. 2. *Omocena dollmani*, sp. n.
Fig. 3. *Macroplectra flavata*, sp. n.
Fig. 4. *Narosa albescens*, sp. n.
Fig. 5. *Narosa irrorata*, sp. n.
Fig. 6. *Niphadolepis griseicostalis*, sp. n.
Fig. 7. *Natada caliginosa*, sp. n.
Fig. 8. *Omocena songeana*, sp. n.
Fig. 9. *Delorachis kilosa*, sp. n.
Fig. 10. *Delorachis kitale*, sp. n.
Fig. 11. *Parasa costalis*, sp. n.
Fig. 12. *Parasa marginata*, sp. n.
Fig. 13. *Parasa cor*, sp. n.
Fig. 14. *Cosuma flavimacula*, sp. n.
Fig. 15. *Parasa divisa*, sp. n.
Fig. 16. *Altha basalis*, sp. n.
Fig. 17. *Macroplectra bilineata*, sp. n.
Fig. 18. *Stroteroides albitibiata*, sp. n.
Fig. 19. *Miresa livida*, sp. n.
Fig. 20. *Macroplectra cinnamomea*, sp. n.
Fig. 21. *Phlebodicha cardinalli*, sp. n.

BIBLIOGRAPHICAL NOTICE.

A Facsimile of R. H. Beddome's Articles on Indian Reptiles, 1862–1870. (Journal of the Society for the Bibliography of Natural History, i. 1940, part 10, pp. 273–334.)

THIS is another facsimile reproduction of rare but important papers on natural history, and the Society is to be congratulated both on its policy and the manner of carrying it out. Dr. Malcolm Smith contributes an explanatory introduction, and the whole should be of immense value to herpetologists, few of whom can be in a position to consult the original articles. The reproduction, which includes Beddome's own MS. corrections, is excellently done, and the only criticism which can be made is that one of the articles is out of its place in chronological order.

Fig. 1

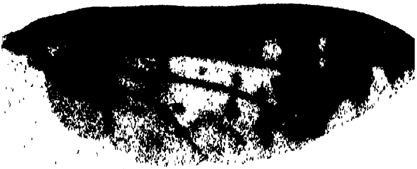


Fig. 2

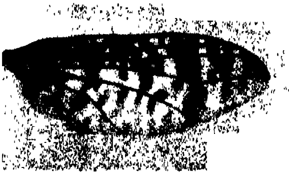


Fig. 3

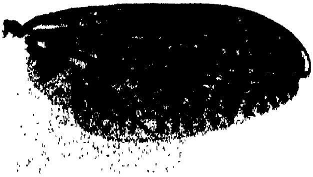


Fig. 4

Fig. 5

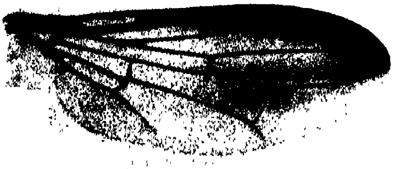


Fig. 6

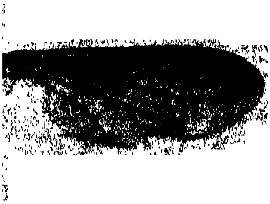


Fig. 7

Fig. 8

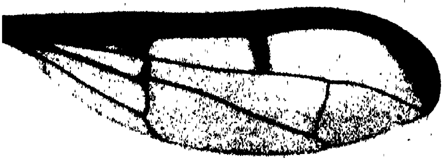


Fig. 9

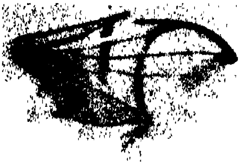
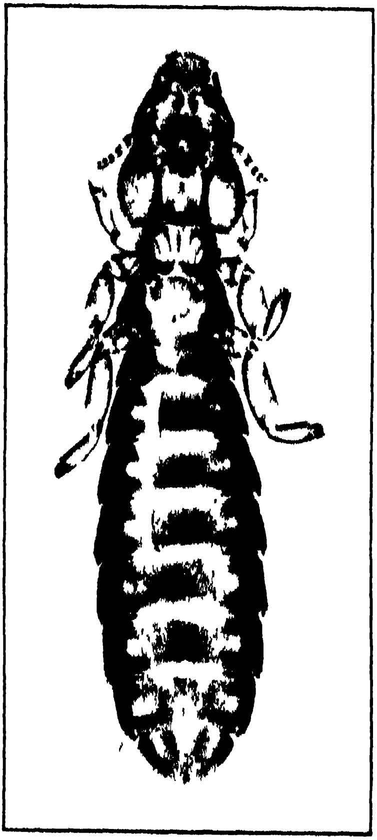


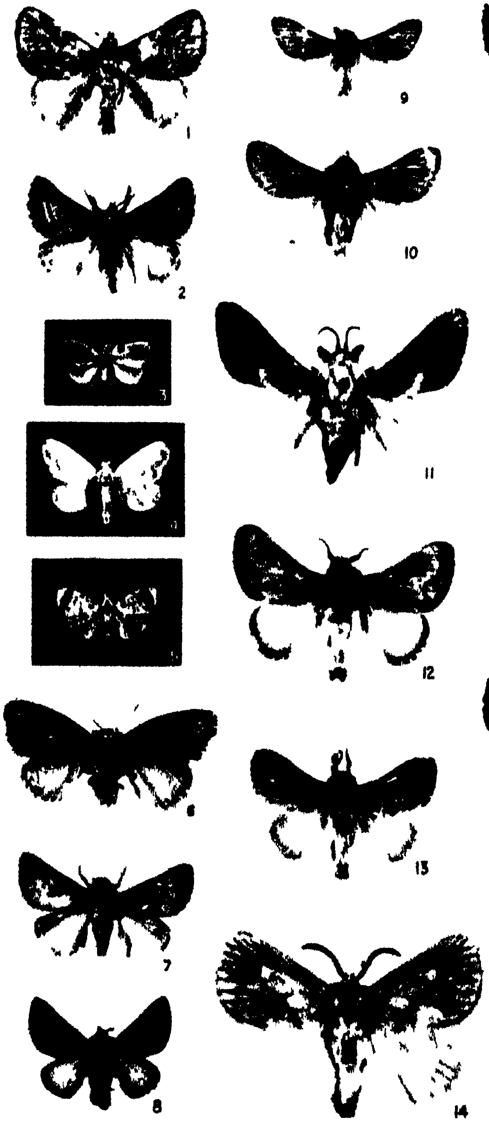
Fig. 10



Pelmatocerandra setosa (Giebel), ♀. × c. 27.

West

Ann. & Mag. Nat Hist. S. 11. Vol. VI. Pl. III.



New Species of Limacodidæ

THE
ANNALS AND MAGAZINE
OF
NATURAL HISTORY.

[ELEVENTH SERIES.]

No. 32. AUGUST 1940.

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XI.—*The Ordovician Trilobite Fauna of the Shelve-Corndon District, West Shropshire.*—Part II. Cyclopygidæ, Dionididæ, Illænidæ, Nileidæ *. By W. F. Whittard, D.Sc., Ph.D.

[Plates IV.–VII.]

Family **Cyclopygidæ** Raymond.

Nicholson and Etheridge (1880, p. 287) recognized from the Girvan District three kinds of *Cyclopyge* [=*Æglina*] which they thought might later receive different generic names. *Cyclopyge*, genotype *C. rediviva* (Barrande) (1846, p. 34), is characterized by the eyes being lateral in position and not united in front; *Phylacops*, genotype *P. vigilans* Cooper & Kindle (1936, p. 366), shows the eyes joined into a single visual organ round the glabellar front; *Symphysops*, genotype *S. armata* (Barrande) (Raymond, 1925, p. 64), shows the eyes fused as in *Phylacops*, but the glabella is produced anteriorly into a frontal spine. Cooper and Kindle (*vide supra*) state that *Cyclopyge* has from none to three pairs of glabellar furrows, *Symphysops* two pairs, and *Phylacops* only one pair; the two latter genera may in the future be found to exhibit as much variation in the number of glabellar furrows as does *Cyclopyge*; *P. monophthalmus* certainly shows three pairs of furrows.

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* For Part I. (Agnostidæ, Raphiophoridæ, Cheiruridæ), see Ann. & Mag. Nat. Hist. ser. 11, vol. v. 1940, pp. 153–172, pls. v. & vi.

CYCLOPYGE Hawle & Corda, 1847.

Cyclopyge binodosa (Salter).

1859. *Æglina binodosa* Salter, p. 50, fig. 6.
1864 *b*. *Æglina binodosa* Salter, pp. 1–2, pl. iv. figs. 1–6.
1866 *a*. *Æglina binodosa* Salter, p. 317, pl. xi. B, fig 3.
1881. *Æglina binodosa* Salter, p. 514, pl xi. B, fig. 3.
1937. *Cyclopyge binodosa* Richter, p. 299.

Most of Salter's syntypes cannot be traced, and the following description is founded upon several specimens which are preserved as well as, if not better than, the original material.

The greatest length attained is about 31 mm., with a corresponding breadth of 17 mm. (Pl. IV. fig. 1, GSM: RR 618); most individuals are, however, smaller. The cephalon shows a large, gently convex, almost oval glabella which is slightly broader than long (Pl. IV. figs. 1 & 2, GSM: RR 618 & 62385); a tubercle is situated in the mid-line nearer to the front than to the posterior margin. Axial furrows trend outwards, but about two-thirds the distance along the glabella they swing inwards towards the front border. There is no occipital ring or posterior border. On the internal cast, and also on the test, the ornament at the back of the glabella consists of a series of delicate transverse grooves. The fixed cheeks are exceedingly narrow, but attain their maximum breadth posteriorly. The facial suture passes inwards for a short distance from the posterior border, and then outwards subparallel to the axial furrow, which it follows towards the front border. The eyes are large, and concavo-convex in outline, with the posterior extremity broader and more rounded than the anterior one (Pl. IV. figs. 3 & 4, GSM: RR 306 & 308); the facets are relatively large, hexagonal in shape, and of uniform size, thus making a regular pattern (Pl. IV. figs. 5–7, GSM: 62391 & RR 690). Certain specimens preserved so as to exhibit the front view clearly demonstrate that the eyes are not fused anteriorly into a single visual organ (Pl. IV. fig. 8, GSM: RR 690); furthermore, the faceted surface extends from a dorsal aspect round to the ventral side.

The hypostoma is incompletely preserved in any specimen, and Salter's original cannot be traced (1864 *b*, pl. iv. fig. 2). The description is best made from two specimens (Pl. IV. figs. 9 & 10, GSM: 62392 & GSb 3026); there is one large, oval, central lobe which attains a maximum breadth about midway along the length, and posteriorly this is separated by a deep groove from a broad tumid border. The postero-lateral corners may have been extended into bluntly rounded wings. Antero-lateral wings are developed at the level of the greatest hypostomal breadth, and these provided articular areas with the underside of the cephalon; a narrow, but strong, ridge on the inner margin of the wing appears to represent the anterior prolongation of a much reduced convex lateral border (Pl. IV. fig. 10). The whole surface, with the exception of the furrows, is traversed by narrow grooves, and a similar ornament is apparent on the ventral doublure of the cephalon.

The thorax comprises six segments, of which the third is provided with a pair of tubercles on the axial ring. The simple rings, defined by strong axial furrows, decrease in breadth posteriorly, but accompanying this is an increase in breadth of the thoracic pleuræ, so that the thorax remains essentially parallel-sided. On the internal cast the rings are ornamented by a series of delicate terraced lines which are convex forwards, and arranged approximately at right angles to the axis. The pleura shows a single oblique furrow and is bluntly terminated.

The pygidium is triangular, and in this respect differs from most species of *Cyclopyge* (Pl. V. figs. 1 & 2, GSM: 62411 & 35267). There is a pronounced posterior and lateral border, defined internally by a furrow. The pleural lobes are convex, join behind the axis, and are usually smooth, although they may show faint furrows. A furrow occurs behind the anterior edge and originates where the axial furrow meets the front margin; anterior to this furrow, the surface rises to make a slight ridge and then plunges forwards and downwards to form a triangular facet. The axis is conical, extends about four-fifths of the distance along the pygidium, and suddenly decreases in breadth after the first axial ring. There are usually four segments on the axis and a small terminal piece.

Young Stages.—A few specimens of immature individuals have been found, but nothing younger than Meraspis Degree 4 has been discovered; the length is about 4·5 mm. (Pl. V. fig. 3, GSM: 62412). The cephalon is poorly preserved, but the glabella appears relatively to be larger than in the adult; the transitory pygidium has two clearly defined segments which have not yet been proliferated forwards, and behind these the axis shows two further rings and a terminal piece. The thorax possesses four articulating segments, and the third of these, counted from the front, carries a pair of tubercles on the axial ring; consequently there is only one segment in the Meraspis Degree 4 behind that showing the median tubercles, whereas in the adult there are three such segments; this shows that the "thoracic segments are released one by one from dorsal fusion in the posterior shield or 'transitory pygidium'" as Stubblefield has so convincingly demonstrated (1926, p. 369, pl. xiv.).[*] Another Meraspis (? Degree 4) showed strongly faceted eyes which are already an important and relatively large development on the cephalon. An isolated pygidium has one clearly delimited anterior segment, the remainder of the pleural lobes being almost smooth, but the axis shows three further rings and a terminal piece (Pl. V. fig. 4, GSM: 62413); this pygidium may have belonged to a Meraspis Degree 5. The holaspid condition was apparently attained, at least in one individual, when the length was 6·5 mm. (Pl. V. fig. 5, GSM: 62414).

Geological Horizons and Localities.—The Hope Shales of Cefn Gwynlle and of Hope Dingle Stream near Oakedge just above Hope Church, the species being very common at both places; other localities are in the Hope Dingle Stream one-third mile south-east of Fox Inn and 92 yards south of Hope Villa, Round Hill Mine, stream ½ mile north-west of Bog Mine, Bog Brook 220 yards south of Ritton Farm, and Whitsburn Dingle Brook by Overton Rough. Well-preserved but incomplete material can be recovered from the shales interbedded in the Stapeley Volcanic Group at Tasgar Quarry.

Syntypes.—GSM: 35267 & 62391.

Remarks.—*C. binodosa* is a characteristic form and can be readily identified by the triangular pygidium on which the first axial ring is better developed than are the remaining rings, by a pair of tubercles on the third thoracic axial ring and by the oval shape of the ungrooved glabella. The nearest ally is *C. prisca* (Barrande, 1872, p. 63, pl. v. figs. 1–7; pl. vii. figs. 19 & 20; pl. viii. figs. 5–6; and pl. xiv. fig. 1), which, however, possesses a more circular glabella exhibiting a pair of pits and also a pair of lateral lobes, shows a spinose sixth pair of thoracic pleuræ, and a more rounded pygidium.

Cyclopyge caliginosa (Salter).

1866 *a*. *Æglina ? caliginosa* Salter, p. 318, pl. xi. A, figs. 10 & 10 *a*.
1881. *Æglina ? caliginosa* Salter, p. 515, pl. xi. A, figs. 10 & 10 *a*.
1937. *Cyclopyge caliginosa* Richter, p. 299.

The material from North Wales is distorted by cleavage, but the Shropshire specimens, although somewhat compressed, show that the outline was ovate, the length being approximately twice the maximum breadth. The eyes have so far not been found in this species.

The cranidium is gently convex and illænid-like in appearance: it is about as broad as long (Pl. V. figs. 6 & 7, GSM: RR 619 & 62415). The glabella is almost circular in outline and devoid of furrows; there is no occipital ring or posterior border. The axial furrow is shallow and curves gently outwards from the hinder margin. The fixed cheek is triangular in shape, decreases in breadth anteriorly, and reaches forward for two-thirds the cranidial length, when it is cut off by the axial furrow meeting the facial suture. So far as can be seen, the suture trends outwards and thence round the cranidial front.

The thorax is constituted of five segments, and in this respect differs from most members of the family. The axial rings, defined by pronounced furrows, occupy much of the breadth of the thorax anteriorly, but posteriorly they are much less wide; this convergence is continued in an even more pronounced manner on the pygidium, so that the axis only extends one-half, or less, of the distance along its length. The thoracic pleuræ are narrow on the forward segments, but there is a marked increase in breadth on the hinder ones; they are all bluntly terminated and each is provided with a simple oblique pleural furrow. The antero-lateral corners of the first thoracic pleuræ are bevelled and form facets.

The pygidium is semicircular, carries a pronounced border, is gently convex, almost smooth, and illænid-like. The axis is short, triangular, and shows four segments. On the pleural lobe immediately behind the anterior border there is a deep furrow originating at the position where the axial furrow cuts the pygidial margin, and the furrow is continued inside the lateral pygidial border; pleural furrows are faintly discernible in some specimens (Pl. V. fig. 7, GSM: 62415). An additional specimen shows a broad doublure and also a smooth facet (Pl. V. fig. 8, GSM: RR 967).

Geological Horizon and Localities.—The Hope Shales of Ritton Castle, and from the Hope Dingle Stream just south of the Fox Inn, from near the footbridge above the Inn, and from an outcrop 92 yards south of Hope Villa.

Lectotype. From the Llanvirn beds of Ty-obry (Pl. V. fig. 9, GSM: 35265).

Remarks.—The only comparisons necessary are with those species showing five thoracic segments instead of six, which is the number usually exhibited by most representatives of the family. *Cyclopyge illænoides* (Richter, 1937, p. 294, text-figs. 1–4) is much more convex, smaller, and differs markedly in the pygidium, which apparently possesses no border and no well-defined axis. *C. pachycephala* (Hawle & Corda, 1847, p. 64; and Barrande, 1852, p. 668, pl. xxxiv. figs. 14–18) shows a similar glabella, but the fixed cheeks are narrower, and the pygidium apparently carries no definite border, has two segments on a much shorter axis, and no pleural furrows. *C. speciosa* (Barrande, 1852, p. 667, pl. xliii. figs. 40–43; and 1872, p. 64, pl. ii. figs. 17 & 18, pl. iii. figs. 5–9, & pl. viii. figs. 7–9), although similar in general form, has a much more elongated glabella, and the thoracic and pygidial axis does not show the characteristic posterior tapering found in *C. caliginosa*. *C. major* (Salter 1853 *a*, p. 4, pl. x. figs. 9, 9 *a–b*) is probably a species with five thoracic segments, although the restored figure shows six; the tapering axis is not unlike that of *C. caliginosa*, but the pygidium possesses no border, the axis is incomplete posteriorly, and shows only two rings.

Of the species showing six thoracic segments, there is a similarity to *C. princeps* (Barrande, 1872, p. 61, pl. xiv.

figs. 3–8), but this differs in the more elongated glabella, the extremely narrow fixed cheek, the greater number of segments both on the thorax and the pygidium, and the longer pygidial axis.

Cyclopyge bergeroni (Novák).

1917. *Æglina bergeroni* Klouček, p. 9, plate, fig. 9.
1918. *Æglina bergeroni* Novák & Perner, p. 34, pl. iv. figs. 34–37, & text-fig. 1.

The general shape of the complete individual is ovate, the length being about two and one-third times the maximum breadth. The cranidium is subtriangular in outline, being 18 mm. long and 14·5 mm. broad at the hinder end (Pl. V. fig. 10, GSM: 62384); it has been crushed, and thus the more convex anterior transverse profile compared with the posterior one, as determined by Novák, cannot be observed. The glabella, defined laterally by pronounced axial furrows, at first increases in breadth, attaining a maximum about one-third of the way along the length; thereafter, the breadth gradually decreases and the glabella is now triangular in form, with the apex rounded; towards the front, the angle between the glabella sides is approximately 50°, which agrees with that measured on Novák's figure of the holotype. The glabella carries two pairs of lateral furrows of arcuate form, the convex side facing anteriorly; the posterior pair is oriented in a horizontal direction, whereas the anterior pair curves more backwards. In this external mould a series of delicate grooves ornament the front, the antero-lateral and the lateral surfaces of the glabella. There is no sign of a frontal spine such as is typical of *Symphysops*. The fixed cheek is triangular, its shortest side corresponding to the posterior margin, and is ornamented by fine terraced lines. The eyes have not been figured, and they are not preserved in the single specimen available for examination, but Klouček states: "Augen gross, jedoch schmäler als bei *A. prisca* Barr., reichen, wie bei dieser Art, vorn unter die Glabella" (1917, p. 9).

The thorax comprises six segments. Axial furrows are deep, and remain essentially parallel-sided as far as the fourth segment, after which they converge. The breadth of the axis decreases from approximately one-half that of the thorax at the first segment to one-quarter at the last segment. The pleuræ are bluntly terminated and each carries a deep furrow directed obliquely backwards and outwards. A fulcrum is developed but occurs close to the axial furrow. The axial rings are ornamented by delicate striæ running subparallel with the front margin, and similar structures transverse to the pleuræ are also visible.

The pygidium is almost semicircular in outline. The axis extends for no more than half-way along the shield, and is provided with four rings. The pleural lobes are gently convex and exhibit four pleuræ corresponding to the axial rings, separated by moderately wide, shallow furrows. Just internal to the front border of the pleural lobes there is a deep subparallel furrow which coalesces with the lateral and posterior border furrow ; a pronounced flat border is delimited by these latter furrows and the pygidial edge.

Geological Horizon and Locality.—The Hope Shales of Cefn Gwynlle.

Remarks.-- Although Novák's figures of *C. bergeroni* are not of the best, yet there appears to be no doubt that the Shropshire specimens should be referred there. No previous record of this characteristic Bohemian species has been made from Britain.

Cyclopyge occipitalis, sp. n.

The species is known from a single specimen which is an almost complete cranidium measuring 4 mm. long and 5·5 mm. across the greatest breadth (Pl. V. fig. 11, GSM : 62417). Anteriorly the glabella is triangular in shape, the apex is rounded in a manner similar to that seen in *C. bergeroni*, and the glabellar sides make an angle of 75°. At about two-thirds of the distance from the front, the glabellar outline swings suddenly inwards and becomes horizontal, but on either side of the mid-line turns abruptly downwards to form a posteriorly directed median convexity. A posterior furrow extends almost entirely across the glabella and also shows a median convexity parallel to that already described delimiting the hinder glabellar margin ; a pair of curved, short furrows occur in front of the posterior furrows. The fixed cheek is extremely narrow anteriorly, and posteriorly it increases in breadth and wedges between the postero-lateral portion of the glabella and the posterior border. The occipital ring is almost flat and occupies about half the maximum cranidial breadth; it is sharply marked off by the axial furrow. The posterior border is not so broad as the occipital ring. The eyes are unknown.

Geological Horizon and Locality.—The Hope Shales of Ladyhouse Dingle north-west of Hope Farm where the stream enters College Coppice.

Holotype.—GSM : 62417.

Remarks.—This exceptional form has no direct parallel among the Cyclopygidæ because the posterior border and the occipital ring are fully developed. If these structures for the moment be disregarded then there is a close similarity in the remainder of the cranidium with *C. bergeroni*. *C. occipitalis* is, presumably, the less specialized, for it has retained more evidence of trilobite segmentation in the form of a differentiated posterior border and occipital ring

PHYLACOPS Cooper & Kindle, 1936.

Phylacops monophthalmus (Klouček).

?1852. *Trilobites infaustus* Barrande, p. 915, pl. xxxiv. fig. 45.
1917. *Æglina monophthalmus* Klouček, p 13, plate, figs. 4–6.
1931. *Cyclopyge monophthalmus* Whittard, p. 328.
1933. *Symphysops monophthalmus* Stubblefield (in Kitchin), p. 82.

The cephalon, in which the paired eyes are fused into one structure, was first described by Klouček from the $Dd_{1\gamma b}$ strata of Šárka, Bohemia; three specimens from Shropshire and one from South Wales are now known, and two of these exhibit parts of the thorax; the fused eyes are unpreserved in the British material.

The smoothly rounded and gently convex cranidium shows a narrow (Pl. VI. fig. 1, GSM : RR 614) and a broad form (Pl. VI. fig. 2, BM : I 4530). The axial furrow passes outwards from the posterior border and midway along the glabellar length sweeps inwards to meet its fellow in the midline; the two axial furrows do not merge one into the other on a gradual curve, but meet in an extremely obtuse angle. The glabella shows two furrows traversing the entire breadth, and a pair of anterior lateral furrows, each member of which is directed horizontally across one-quarter the glabellar breadth. Laterally, the two continuous furrows are horizontally disposed, but medially they curve down. The fixed cheek is narrow, being broadest posteriorly.

The thorax is incompletely preserved, but the axis is obviously broad and tapered posteriorly ; axial rings are longitudinally strongly convex, while the pleuræ are short, rather stumpy, bluntly terminated, and each carries one deep, straight, pleural furrow which is inclined backwards (Pl. VI. figs. 2 & 3, BM : I 4530 & GSM : Pr 2033).

The pygidium has not been described for the species.

Geological Horizon and Localities.—The Hope Shales of Ritton Castle, and of Hope Dingle Stream 92 yards south of Hope Villa and also immediately south of the Fox Inn. Another example was obtained from *D. bifidus* shales of Cefn Farchen Farmyard ⅞ mile south-east of Llanfallteg Railway Station, Pembrokeshire.

Remarks.—Barrande (1852, p. 915, pl. xxxiv. fig. 45) figured and described under *Trilobites* (=*Phylacops*) *infaustus* a trilobite from the D beds of Trubin of which he was unable to determine the affinities. Klouček (1917, p. 13) places the horizon as D_3 and remarks that the species is related to *P. monophthalmus*, and, owing to the fact that I have been unable to examine specimens of *P. infaustus*, they must at the moment be accepted as different species ; from the figure there appears to be every indication that the two will prove to be synonymous, in which case Barrande's name will have to be adopted.

Family **Dionidæ** Raymond.

DIONIDE Barrande, 1847.

Dionide euglypta (Angelin) var. *quadrata*, nov.

1931. *Dionide* aff. *richardsoni* Whittard, p. 333.

The cranidium is semicircular in outline (Pl. VI. fig. 4, GSM : RR 3042). Glabella is quadrate, slightly constricted near the front, and at the base shows a pair of furrows which run forwards almost parallel to the glabellar margin for about one-fifth of the length ; there is a pair of tubercles arranged in tandem in the mid-line. The short, convex, preglabellar field is clearly delimited posteriorly by the preglabellar furrow. The broad, gently convex, fixed cheeks carry a characteristic reticulate ornament, comprising numerous coarse punctæ separated by inosculating ridges. The nervures (=genal cæca of Raymond), which pass in most species of *Dionide* from near the antero-lateral corners of the glabella towards the genal angle, may be indicated by faint ridges, but the presence of these structures is not at all conclusive. Three rows of coarser punctæ are present anteriorly just within the narrow, smooth border, but when followed laterally these pass into two rows and eventually, near the genal angle, into one row. The occipital ring is not clearly delimited in the only available specimen, but the posterior border is well marked and delineated anteriorly by a strong, slightly curved, posterior border furrow. On the left side the base of a broad broken-off spine is seen to pass outwards and backwards from the genal angle.

Three segments of the thorax are preserved. The axial ring is provided on each side with a triangular, nodular lobe ; axial furrow is deep. Pleuræ extend horizontally outwards, and each carries an oblique furrow which divides the pleura into a posterior ridge which expands near the axial furrow, where it becomes almost nodular, and a much less convex anterior area.

The pygidium is subtriangular in outline, the length being a little less than two-thirds the maximum breadth (Pl. VI. fig. 5, GSM : RR 3043). The axis is narrow, gently tapering, extends almost to the posterior margin, carries an articulatory half-ring, and shows 13 rings, but, since the posterior surface is not preserved, there may be as many as 20 rings. At least 17 pairs of pleuræ are developed, the anterior ones carrying an oblique pleural furrow.

Geological Horizon and Locality.—Aldress Shales, *Dicranograptus clingani* Zone, of Aldress Dingle about 1500 yards south-west of Little Aldress.

Holotype.—GSM : RR 3042.

Paratype.—GSM : RR 3043.

Remarks.—Although *Dionide* is a well-defined genus, many of the species are so finely drawn that the selection of the characters which separate any particular type is a matter of some difficulty ; this is particularly the case with *D. formosa* * (Barrande, 1852, p. 641, pl. xlii. figs. 24 & 28; Hawle & Corda, 1847, p. 37, pl. iii. fig. 16; and Raymond, 1925, p. 22), *D. euglypta* (Angelin, 1851, p. 12, pl. ix. fig. 6; and Asklund, 1936, p. 4, pl. ii. figs. 1–6), and *D. richardsoni* (Reed, 1903, p. 26, pl. iv. figs. 3–8; 1914, p. 5, pl. i. fig. 3; and 1931, p. 5). The latter species is distinguished apparently by the longitudinal basal glabellar furrows diverging anteriorly and separating a pair of basal lobes, by the presence of a longitudinal carina on the glabella passing posteriorly into a spine, and, according to Reed, by the ornamentation of the pleuræ. *D. formosa* carries a single tubercle on the glabella and the nervures are strongly developed. *D. euglypta*, as interpreted by Asklund, shows two tubercles on the swollen glabella and possesses a subtriangular pygidium. The Shropshire material approaches most closely to the latter species from the *Trinucleus* Beds of Ashgillian age; the varietal distinction is made on the glabella, which is rounded in *D. euglypta*, and quadrate, less swollen, and exhibits a slight transverse constriction in var. *quadrata*; none of these differences is serious enough to raise the Aldress Shale form into a species, and conceivably future material may prove its identity with *D. euglypta*.

D. atra (Salter, 1866 *a*, p. 321, pl. xi. A, figs. 9 & 9 *a*) is difficult to compare with other species since nothing is known of the thorax or cephalon; the specimens from Ty-obry are distorted, but the general impression from the figures is that the pygidium is rounded rather than subtriangular, and there are 20 axial rings and a corresponding number of pairs of pleuræ.

Dionide rotundata, sp. n.

The cranidium of the only available specimen is small, measuring 3·0 mm. long and 8·3 mm. broad (Pl. VI. fig. 6, GSM: 62418). The glabella is excessively convex, rounded in outline, and shows at the base a pair of elongated lobes which are delimited internally by furrows oriented parallel to the axial line; there is a single small tubercle situated in the mid-line at a third of the distance along the glabella from the occipital furrow. The occipital ring is short; posterior border is smooth, convex, with the surface predominantly inclined forwards, and posterior furrow is deep. The preglabellar field is short and convex, and expands laterally into the large fixed cheeks; these are ornamented with punctæ, separated by anastomosing ridges which exhibit a radial arrangement; there is no sign of the strong nervures passing from the antero-lateral corners of the glabella to the genal angle. The brim is well-marked and characteristically frilled, less along the anterior course than laterally; at the inner margin of the brim there is a series of pits which, so far as can be determined, are arranged roughly in two rows. On the left cheek there is a groove or crack originating near the antero-lateral corner of the glabella, trending parallel to the cranidial margin, and reaching the posterior border furrow. No such crack is visible on the right side, and it almost certainly possesses no structural significance. The free cheeks, thorax, and pygidium are unknown.

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* Raymond contends that Bohemia has supplied at least four species of *Dionide* (1925, pp. 22–27); there is much to support his retention of *D. speciosa* (Hawle & Corda), which was included by Barrande in *D. formosa*. Novák's example of *D. formosa* from the Dd_5 beds (1884, p. 30, pl. viii. figs. 17 *a–b*) is also placed by Raymond in *D. speciosa*.

Geological Horizons and Localities.—The Hope Shales of Whitsburn Dingle at Overton's Rough 340 yards from Blue Barn Cottage, near Leigh Manor, and from the Stapeley Shales of the stream north-east of Ganderbeach.

Holotype.—GSM : 62418 & 62419.

Remarks.—The rounded and extremely convex glabella, the frilled brim, and the single small glabellar tubercle separate this species from all previously described forms. *D. rotundata* is most nearly allied to *D. jubata* (Raymond, 1925, p. 25, pl. i. figs. 12 & 13), but is distinguished by the glabella and brim. A detailed account of the genotype of *Trinucleoides* (=*T. reussi* Barrande) has just appeared (Whittington, 1940, pp. 255–259, pl. i. fig. 7 & pl. iv. figs. 1–8), and this genus clearly recalls *D. rotundata*. An additional resemblance is forthcoming since Dr. Elles described *T. reticulatus* (1939, p. 427, pl. xxix. figs. 6–9), for this carries a reticulate ornament on the fixed cheek as in our species, but the glabellar shape and direction of the furrows, the absence of a preglabellar field, and the smooth brim are sufficient characters by which to distinguish *Trinucleoides*.

Family **Illænidæ** Corda.

ECTILLÆNUS Salter, 1867.

Ectillænus has not been recognized as a valid genus mainly because Salter considered *E. perovalis* and *E. hughesi* as synonyms, and he framed his description of the former species on material which included representatives of the latter type (Holm, 1882, p. 15, and 1886, p. 21; Raymond, 1916, p. 9). Nevertheless, even if Salter were incorrect regarding the identity of the two species, this does not necessarily invalidate the genus of which *E. perovalis* is the genotype. *Ectillænus* is a useful reference for those distinctive illænids which are apparently blind, or possess only diminutive eyes, and also exhibit a facial suture which curves inwards to cut the posterior margin. *Ectillænus* would at least include *E. perovalis* (Murchison) and *E. perovalis* forma *hughesi* (Hicks) from Britain, *E. katzeri* (Barrande) and *E. benignensis* (Novák) * from Bohemia, and possibly *I. sarkaensis* Novák should also be placed here.

Raymond (1916, p. 14) has proposed *Wossekia* for the reception of illænids in which the genal spines are absent and the eyes are small and far forward; the genotype is *Illænus katzeri* Barrande. This species is here considered a typical member of *Ectillænus*, and consequently *Wossekia* becomes a synonym and should be discarded. Warburg (1925, p. 99, footnote) seems even less prepared to accept Raymond's *Wossekia* as a valid genus than she is regarding his other genera, her argument being that there are additional illænids in which the eyes have become reduced, and these species show a less close relationship to *I. katzeri* than they do to other members of the family. Consequently, as Warburg is unprepared to accept *Wossekia*, she will on the same grounds refuse *Ectillænus*. In addition to the diminutive eyes, which might well indicate, but not necessarily prove, degeneracy, there is the turning inwards of the facial suture along its posterior course. If both these characters are considered together, there appear to be sound reasons for the retention of *Ectillænus*.

Diagnosis.—Glabella with parallel, almost straight, axial furrows extending half the length of cranidium;

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* This is a synonym of *E. perovalis* forma *hughesi* (see p. 144).

eyes absent or small; facial suture curves inwards to cut the posterior border; free cheeks small. Thorax of ten segments. Pygidium semicircular, unsegmented, short axis, broad doublure.

Genotype.—*Ectillænus perovalis* (Murchison).

Ectillænus perovalis (Murchison).

1839. *Illænus ? perovalis* Murchison, p. 661, pl. xxiii. fig. 7 *a*.
1849. *Illænus perovalis* Salter, p. 4 (pl. ii.).
1866 *a*. *Illænus perovalis* Salter, p. 256.
1867. *Illænus* (*Ectillænus*) *perovalis* pars, Salter, p. 211, pl. xxvi. figs. 5 & 6.
1882. *Illænus perovalis* Holm, pp. 15 & 47.
1886. *Illænus perovalis* Holm, p. 21.
1916. *Illænus perovalis* Raymond, p. 9.

The holotype (Pl. VII. figs. 1 & 2, GSM: 6844) is a small individual measuring 19·5 mm. long with a breadth across the thorax of 11·5 mm. The specimen is preserved in a fine-grained tuff and is not compressed.

The cephalon is incompletely preserved, for the free cheeks are missing. The cranidium is moderately convex, the thorax and pygidium being noticeably more depressed (Pl. VII. fig. 2). The glabella, which is about one-third the cranidial breadth, is defined by almost parallel and deep axial furrows extending along half the cephalic length. No axial pits have been seen. A narrow posterior border is present. The course of the facial suture is not well shown, but it swings inwards to cut the posterior border. There is no evidence of an eye or palbebral lobe, and Salter may have been correct when he suggested that the species was possibly a blind one; on the other hand, the eye may be so small that, as in the case of *E. katzeri* from Bohemia which was once presumed to have been blind, this structure will only be observed when much more and better-preserved material is available.

The thorax consists of ten segments. The axis is strongly convex, tapers markedly posteriorly, and is approximately equal in breadth to the distance between the axial furrow and the fulcrum. Pleuræ extend horizontally outwards to the fulcrum, at which position they are deflected, and terminate bluntly (?). The pygidium is semicircular; axis is about one-quarter the total pygidial breadth and rapidly tapers so that it terminates a little less than half-way along the shield.

The front margin extends horizontally outwards from the axis, but, when in line with the pleural fulcrum, it suddenly turns downwards to form the edge of the facet. The doublure is broad and sweeps round the pygidium from the inner end of each facet.

Geological Horizons and Localities.—The species is infrequent but has been recorded from a fine-grained tuff interbedded in the Hope Shales of Hope Mill (Hope Village), and also occurs in the Hope Shales at Ritton Castle: in all cases the horizon is that of *D. bifidus* Zone.

Holotype.—GSM. 6844.

Remarks.—Structurally, no difference can be determined between *E. perovalis* and *E. perovalis* forma *hughesi*, but the former is narrow and possesses a much more slender and tapering axis to the thorax, while the latter is broader and more sturdy in proportions. I am inclined to favour Salter's view that the two are synonymous, for illænids tend to show narrow and broad individuals in the same species; such a condition may be an expression of different sexes. Nevertheless, a distinction between the two types may usefully be made, and since the differences in proportion can hardly be reckoned as of either specific or even varietal importance, the best course to adopt is to record Hicks's specimen as *E. perovalis* forma *hughesi*. Owing to the incompleteness of the second of Murchison's figured specimens (1839, pl. xxiii. fig. 7 *b*, GSM: 6845), which is re-figured here (Pl. VII. fig. 3), there is uncertainty whether this is really *E. perovalis*; if the segments preserved are actually the last ones of the thorax, then the axis is relatively broad and consequently the specimen is perhaps better referred to *E. perovalis* forma *hughesi*.

Ectillænus perovalis (Murchison) forma *hughesi* (Hicks).

?1839. *Illænus ? perovalis* Murchison, p. 661, pl. xxiii. fig. 7 *b*.
1867. *Illænus* (*Ectillænus*) *perovalis* pars, Salter, p. 211, pl. xxvi. figs. 7 & 8.
1875. *Illænus hughesi* Hicks, p. 184, pl. ix. fig. 7.
1882. *Illænus hughesi* Holm, pp. 16 & 46.
1886. *Illænus hughesi* Holm, p. 21.
1916. *Illænus hughesi* Raymond, p. 10.
1918. *Illænus benignensis* Novák & Perner, pl. ii. figs. 17–26.

The holotype (Pl. VII. fig. 4, SM: A 15629) is very much compressed and shows little of the structure of the cephalon; the following description is founded upon better-preserved specimens from Shropshire.

The cephalon is sub-semicircular in outline (Pl. VII. fig. 5, BM: In 37971). The glabella is about one-third the cranidial breadth and defined by almost straight axial furrows which extend half-way along the cranidium; a small median tubercle occurs near the posterior glabellar margin. No axial pits have been observed. A posterior border furrow is developed. The fixed cheeks are moderately convex but not so rounded as the glabella. The facial suture is sigmoidal in shape and posteriorly bends inwards to cut the posterior margin (Pl. VII. figs. 6 & 7, GSM: RR 611 & RR 610); although previous authors have claimed to have seen the eyes, in the several specimens now available neither eye nor palpebral lobe can be determined. The free cheek is subtriangular in outline and there is no spine (Pl. VII. fig. 5, BM: In 37971). Delicate terraced lines are present on the cranidium, but other specimens, in which the impression of the underside of the test is preserved, exhibit numerous punctæ interspersed with irregular ridges.

The thorax comprises ten segments (Pl. VII. fig. 8, BM: In 37964). The axis is broad, almost parallel-sided, and wider than the distance between the pronounced axial furrow and the fulcrum. The pleuræ are ungrooved and bluntly terminated; when preserved as internal casts, they show a characteristic ornament comprising delicate terraced lines directed obliquely across their breadth (Pl. VII. fig. 9, GSM: 35280); the axial segments exhibit lines arranged almost horizontally.

The pygidium is semicircular in shape, and shows a short axis which rarely reaches as far as the mid-length of the shield. A vertical facet occurs at each antero-lateral corner. The doublure is broad, extends round the pygidium, and originates on each side at the inner end of the facet which, in its turn, corresponds to the line of the fulcra on the thoracic pleuræ. The ornamentation on the doublure consists of concentric terraced lines with intervening punctæ.

Geological Horizons and Localities.—The Hope Shales have provided material at many localities in the Hope Dingle Stream, and specimens have been collected from the Whitsburn Stream by the side of Overton's Rough west of Leigh Manor, and from Ritton Castle.

Holotype.—SM: A 15629 from the *D. bifidus* beds of Llanvirn Quarry, St. David's, Pembrokeshire (Pl. VII. fig. 4).

Remarks.—The differences between forma *hughesi* and *E. perovalis* have already been given (see p. 144). The form vividly recalls *E. katzeri* of Bohemia (Barrande, 1872, p. 72, pl. v. figs. 28–37, pl. vi. figs. 1–4, and pl. xiv. fig. 36; Novák & Perner, 1918, pl. iii. figs. 19–23), which possesses a much more triangular pygidium exhibiting a faintly segmented axis; this species also carries small eyes, as was first pointed out by Holub (1909, p. 7, plate, figs. 7–8), but in all probability both *E. perovalis* and forma *hughesi* will be found to have eyes when better preserved material is to hand. *E. benignensis* (Novák & Perner, 1918, pl. ii. figs. 17–26) is almost certainly the same as *E. perovalis* forma *hughesi*; it should therefore rank as a synonym.

Family **Nileidæ** Angelin.

Poulsen has proposed that the Symphysuridæ, including *Nileus*, *Symphysurus*, and probably *Symphysurina* *, should be separated from the Asaphidæ because the facial suture is "intramarginal and thus confined to the dorsal surface of the cephalon" (1927, p. 321). As Stubblefield (1936, p. 436, footnote) has already indicated, the family name of Nileidæ actually holds precedence since it was erected by Angelin in 1854. Brøgger (1886, p. 64) also recognized the need to separate *Nileus* and *Symphysurus* from the Asaphidæ, but he included them in a subfamily. *Barrandia* and *Homalopteon* are also placed with reservation by Reed in the Nileidæ (1931 *a*, pp. 443 & 467–69), for, referring to *B. homfrayi*, he states that the "absence of a sagittal suture across the doublure . . . makes us inclined to remove it from the Asaphidæ and to put it with the Nileidæ"; although representatives of the first-named genus occur in the Shelve rocks, I do not propose to enter here into a discussion on the classification of the two genera, and shall, for the time being, refrain from describing the Shropshire material until the affinities of these genera are more fully understood.

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* Reed (1930, pp. 298 & 301) rightly excludes *Symphysurina* from the Symphysuridæ because of its median suture. The genotype is *S. woosteri* from the Oneota Dolomite of Ozarkian age (Ulrich in Walcott, 1924, p. 37, fig. 8), and the definition states that the free cheeks are "separated by a suture precisely like that found in all of the true Asaphidæ" (Ulrich in Walcott, 1925, p. 110).

ILLÆNOPSIS Salter, 1866.

Illænopsis was originally placed by Salter in the Illænidæ, although he noticed that the genus shows affinities with the Asaphidæ (Salter, 1867, p. 212). Holm (1882, p. 16; 1888, p. 21), Raymond (1916, p. 9), Warburg (1925, p. 97), and Reed (1930, pp. 299 & 300) have all refused to admit *Illænopsis* to the Illænidæ, and several have noticed a close resemblance to *Symphysurus*. No further information regarding the complete course of the facial suture is forthcoming, and there is still doubt whether *I. thomsoni*, the genotype, is a blind form or not. At the present *Illænopsis* may be referred to the Nileidæ but with reservation, and it appears to be closer to that family than to either the Illænidæ or the Asaphidæ. *Illænopsis ? acuticaudata* (Hicks, 1875, p. 184, pl. ix. fig. 5) should certainly not be placed in that genus.

Illænopsis thomsoni Salter.

1866 *a*. *Illænopsis thomsoni* Salter, pp. 256 & 316, pl. xi. B, figs. 1 & 2.
1867. *Illænopsis thomsoni* Salter, p. 213, pl. xx. fig. 1.
1875. *Illænopsis thomsoni* Hicks, p. 185.
1881. *Illænopsis thomsoni* Salter, p. 513, pl. xi. B, figs. 1 & 2.

The two specimens that Salter employed in his original description cannot be traced with certainty (1866, pl. xi. B, figs. 1 & 2). The imperfectly preserved pygidium may be represented in the Geological Survey Museum (32837), but the cranidium associated with two thoracic pleuræ of the right side appears to have been lost, although conceivably one individual which shows parts of the cranidium, thorax, and pygidium may be this specimen (GSM: 32836); it has obviously been broken in several places and later mended, and one of the fractures separates the cranidium and parts of two right thoracic pleuræ. The remaining fragments may have been discovered and joined together after Salter had published his descriptions. Whether this is true or not, the specimen is to be referred unreservedly to Salter's species, and was collected in the same beds and at the same locality; consequently it will be here accepted as the holotype.

The cranidium has been squashed over the anterior thoracic segments and the posterior border is not entire (Pl. VI. fig. 7, GSM: 32836). The wide glabella is smooth, approximately as broad as long, being delimited by axial furrows which characteristically diverge forwards, and, just before the anterior margin is attained, suddenly swing outwards, producing a markedly expanded front to the glabella. There appears to be no occipital ring, although the specimen is inconclusive on this point. Fixed cheeks are relatively large, subtriangular, almost flat, and carry a shallow posterior border furrow. The facial suture may be preserved; if so, it is first visible in front of the posterior border and trends inwards and forwards on a regular curve until the outwardly directed portion of the axial furrow is reached, when the suture apparently also swings outwards through more than a right angle, forming a notch. At this notch Salter indicated the eye, but there is no evidence in the present specimen of any such structure; indeed, the notch, and possibly the presumed facial suture, may be fortuitous and arose when the specimen was broken open.

The thoracic segments are so incompletely preserved that the determination of the number is difficult to make; there does seem some evidence, however, of eight (?) segments. The axis strongly tapers posteriorly, and shows rings carrying articulatory half-rings; the pleuræ are grooved and apparently bluntly terminated, although in some views they appear pointed. The first pair of pleuræ shows a facet at the antero-lateral corners.

The pygidium is sub-semicircular in outline, the tapering axis is bluntly rounded posteriorly and exhibits seven (?) rings (Pl. VI. fig. 7). The anterior border carries a deep furrow which also extends round part of the lateral border a short distance in from the margin; this lateral groove (Pl. VI. fig. 8, GSM: 32837) becomes shallow and fades away near the mid-line. The pleural lobes may show extremely faint furrows, but usually they are smooth and exhibit delicate terraced lines which are also present on the axial rings.

Holotype.—GSM: 32836.

Paratype.—GSM: 32837.

Geological Horizon and Locality.—The only undoubted occurrence of the species is from Ritton Castle in rocks presumably of the age of the Hope Shales.

Remarks.—The species is an unsatisfactory one because the structure of the cephalon is far from fully known. The anteriorly divergent axial furrows with their marked outward deflection at the front of the cranidium and the grooved pleuræ suggest that the genus is close to *Symphysurus*; but indubitable evidence of the facial suture and the eye, if it be developed, is necessary before the true affinities of this extremely rare species can be formulated. The probable number and form of the thoracic segments, and the deep groove at the front and sides of the pleural lobes of the pygidium recall *Barrandia*, particularly *B. bohemica* (Novák & Perner, 1918, p. 35, pl. iv. figs. 23–31), but the resemblance is only superficial when the shape of the pygidial axis, the form of the glabella, and the small fixed cheek are taken into consideration. Nothing approaching *I. thomsoni* has been seen by me in literature, and thus it stands for the moment as a species and genus peculiar to Shropshire.

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EXPLANATION OF THE PLATES.

PLATE IV.

Cyclopyge binodosa (Salter) (see p. 130).

(All specimens are from the Hope Shales, *D. bifidus* Zone.)

Fig. 1. Internal cast, showing general characters (GSM : RR 618), × 1⅓. Hope Dingle Stream 92 yards south of Hope Villa.

Fig. 2. The form of the facial suture is well indicated on both sides, as are the pair of tubercles on the axis of the third thoracic segment (GSM : 62385), × 1⅓. Stream ¼ mile north-east of Knotmoor, near Leigh Manor.

Fig. 3. External mould, illuminated to appear as an internal cast, showing the form of the eye and the facets (GSM : RR 306), × 1⅔. Stream ½ mile north-west of Bog Mine.

Fig. 4. Well-preserved and isolated faceted eye (GSM : RR 308), × 1·8. Same locality as above.

Fig. 5. Distorted eye, showing facets, syntype (GSM : 62391), × 1·8. Cefn Gwynlle.

Fig. 6. Enlargement of part of the previous specimen, to show the gently convex surface to each of the hexagonal lenses. × approx. 9.

Fig. 7. Enlargement of part of the eye, showing the internal cast when the lenses have been removed with a needle; some of the lenses have been left in position on the left side. Note the sharp edges to the hexagonal areas and the regular pattern which they make (GSM: RR 690). × approx. 8·2. Stream ¼ mile north-east of Knotmoor, near Leigh Manor.

Fig. 8. Same specimen as above, showing the paired eyes and the cephalon as viewed from the front; the specimen has been crushed in a plane at right angles to the axis of the animal, × 1·7.

Fig. 9. Internal cast, in which the hypostoma is seen attached to the under surface of the anterior border of the cephalon; note the large lobe and also the ornament (GSM: 62392), × 1·7. Cefn Gwynlle.

Fig. 10. External mould, illuminated to appear as an internal cast, showing the hypostoma in position; note the large central lobe, the posterior border, the antero-lateral wing on the right side, and the suggestion of the postero-lateral wing on the left side; ornament present on the hypostoma and on the doublure of the cephalon (GSM: GSb 3026), × 1·8. Same locality as above.

Plate V.

(In figs. 3, 4, 5, and 9 the specimens were coated with magnesium oxide for photographic reasons.)

Cyclopyge binodosa (Salter) (see p. 130).

Fig. 1. Pygidium, in which the triangular shape, the segmented axis, the convex lobes almost devoid of furrows, and the border are well exhibited (GSM: 62411), × 1·8. Hope Shales of the Hope Valley by Oakedge west of Bench Mark 892.

Fig. 2. Incompletely preserved pygidium, syntype (GSM: 35267), × 1·7. Hope Shales of Cefn Gwynlle.

Fig. 3. Young stage, Meraspis Degree 4; note the pair of tubercles on the third thoracic segment and another free segment behind this; then follows the transitory pygidium with two pairs of pronounced pleuræ, and four axial rings and a terminal piece (GSM: 62412), × 5. Hope Shales of Hope Valley by Oakedge west of Bench Mark 892.

Fig. 4. Transitory pygidium, possibly a Meraspis Degree 5; note one well-defined pair of pleuræ, four axial rings and a terminal piece, and the pronounced border (GSM: 62413), × 6. Same horizon and locality as above.

Fig. 5. Holaspid condition of a not fully grown form; note the pair of tubercles on the third thoracic segment, three free thoracic segments posterior to this, and four axial rings and a terminal piece on the pygidium (GSM: 62414), × 4·6. Same horizon and locality as above.

Cyclopyge caliginosa (Salter) (see p. 133).

Fig. 6. The cranidium has moved back over the anterior segments of the thorax, leaving exposed the posterior two segments and part of another lying in front; note the illænid-like form of the cranidium and pygidium, and also the short axis on the latter (GSM: RR 619), × 1·8. Hope Shales of Hope Dingle Steam 92 yards south of Hope Villa.

Fig. 7. Small individual, showing the course of the facial suture, the convergent axis on the thorax and pygidium, the pleuræ and pleural grooves, and the facet on the front of the right anterior thoracic segment (GSM: 62415), × 1¾. Hope Shales of Hope Dingle Stream at footbridge 210 yards south-south-west of Fox Inn Bridge.

Fig. 8. Incomplete specimen, showing the details of the pygidium, and particularly the ornament and width of the ventral doublure (GSM: RR 967), × 1·6. Hope Shales of Hope Dingle Stream at footbridge above Hope Church.

Fig. 9. Lectotype (GSM: 35265), from the Llanvirn beds of Ty-obry, North Wales, × 1.

Cyclopyge bergeroni (Novák) (see p. 135).

Fig. 10. External mould, illuminated to appear as an internal cast, of an almost complete specimen exhibiting glabellar furrows, facial suture, convergent axis of thorax and pygidium, pleural furrows on thoracic pleuræ, and pleural furrows and border to the semicircular pygidium (GSM: 62384), × 1½. Hope Shales of Cefn Gwynlle.

Cyclopyge occipitalis, sp. n. (see p. 136).

Fig. 11. Internal cast of cranidium, showing the glabellar grooves, fixed cheek, occipital ring, and posterior border. Holotype (GSM: 62417), × 5½. Hope Shales of Ladyhouse Dingle north-west of Hope Farm where the stream enters College Coppice.

PLATE VI.

Phylacops monophthalmus (Klouček) (see p. 137).

Fig. 1. Internal cast of cranidium, showing two complete glabellar furrows and a pair of incomplete ones, the fixed cheek, and the facial suture (GSM: RR 614), × 4½. Hope Shales of Hope Dingle Stream 92 yards south of Hope Villa.

Fig. 2. Internal cast of broader type of cranidium and part of thorax (BM: I 4530), × 3. Hope Shales of Ritton Castle.

Fig. 3. Internal cast of compressed cranidium, in which the anterior pair of incomplete glabellar furrows are not preserved; the thoracic segments clearly exhibit the broad axis and the stumpy pleuræ, each with a furrow (GSM: Pr 2033), × 6. *D. bifidus* beds of Cefn Farchen Farmyard, ¾ mile south-east of Llanfallteg Railway Station, Pembrokeshire.

Dionide euglypta (Angelin) var. *quadrata*, nov. (see p. 138).

Fig. 4. Internal cast which has been coated with magnesium oxide for the purposes of photography. Note the quadrate glabella with its basal lobes and pair of tubercles arranged in tandem, the ornament of the fixed cheeks, the broken spine at the genal angle of the left side, and the punctæ along the inner margin of the brim. Immediately to the right of the glabella the cast has been broken through to expose part of the pleuræ of the enrolled pygidium. The structure of the thoracic pleuræ is best seen in the first pleura on the left side, and the nodular lobes are apparent on the first axial ring. Holotype (GSM: RR 3042), × 1¾. Aldress Shales of Aldress Dingle about 1500 yards south-west of Little Aldress.

Fig. 5. Internal cast of poorly preserved pygidium. Paratype (GSM: RR 3043), × 1½. Same horizon and locality as above.

Dionide rotundata, sp. n. (see p. 140).

Fig. 6. Internal cast, showing the tumid glabella, the ornamented fixed cheek, the preglabellar field, the frilled brim, the posterior border, and the short occipital ring. Holotype (GSM: 62418), × 3½. Hope Shales of Whitsburn Dingle Stream midway along Overton's Rough, near Leigh Manor.

Illænopsis thomsoni, Salter (see p. 147).

Fig. 7. Internal cast of holotype, showing typical course of the axial furrows and the course of the presumed facial suture on the right side. The furrowed pleuræ of the thorax can be seen as well as the facet at the front of the first pleura on the left side. The pygidial axis shows a series of well-defined rings and almost smooth pleural lobes (GSM: 32836), × 1. Hope Shales of Ritton Castle.

Fig. 8. Internal cast of a poorly preserved pygidium, showing a furrow on the inner side of the anterior and lateral borders. Paratype (GSM: 32837), × 0·93. Same horizon and locality as above.

Plate VII.

Ectillænus perovalis (Murchison) (see p. 143).

Fig. 1. Internal cast, exhibiting the facial suture, short axial furrows on the glabella, and the facets and short axis on the pygidium; compared with forma *hughesi*, the species is much more narrow. Holotype (GSM: 6844), × 1½. From a fine-grained tuff interbedded in the Hope Shales, Hope Mill.

Fig. 2. Side view of same specimen, showing convexity of the cranidium and the flat profile of thorax and pygidium, × 1½.

? *Ectillænus perovalis* (Murchison) (see p. 144).

Fig. 3. Although the specimen has been referred to this species, and is one of the original types of Murchison, yet the breadth of the thoracic segments (supposing the most posterior ones are preserved) suggests that the fossil should be identified with forma *hughesi* (GSM: 6845), × 1. Same horizon and locality as above.

Ectillænus perovalis (Murchison) forma *hughesi* (Hicks) (see p. 144).

Fig. 4. The holotype of *Illænus hughesi* Hicks (SM: A 15629), × 1. *D. bifidus* beds of Llanvirn Quarry, St. David's, Pembrokeshire.

Fig. 5. Internal cast of almost complete individual, showing the facial suture, free cheeks, short axial furrows, and the greater breadth compared with *E. perovalis* (BM: In 37971), × 1. Hope Shales of Ritton Castle.

Fig. 6. Internal cast of cranidium, showing facial suture typically curving inwards along its posterior course (GSM: RR 611), × 1½. Hope Shales of Hope Dingle Stream 92 yards south of Hope Villa.

Fig. 7. Internal cast of cranidium, showing facial suture (GSM: RR 610), × 1¾. Same horizon and locality as above.

Fig. 8. Internal cast, showing details of the thoracic segments, the position of the fulcra, and the ventral doublure on the pygidium (BM: In 37964), × 1. Hope Shales of Ritton Castle.

Fig. 9. Internal cast, showing the details of the ornament on the thoracic segments (GSM: 35280), × 5. Same horizon and locality as above.

XII.—*New Ordovician Fossils from Girvan, Ayrshire.*

By F. R. C. Reed, M.A., Sc.D., F.G.S.

[Plate VIII.]

[*Introductory Note.*—Among the specimens recently collected by the Misses Gray, and presented to the British Museum as an addition to the Mrs. Robert Gray Collection, are a number of interesting forms which are either undescribed or new records for the Ordovician of the Girvan area. They have been investigated by Dr. F. R. C. Reed, of the Sedgwick Museum, Cambridge, and the present paper, issued from the Department of Geology, British Museum (Nat. Hist.) and prepared for the press by Dr. H. M. Muir-Wood and Dr. K. P. Oakley, is based on his notes.]

Systematic Descriptions.

BRACHIOPODA.

Family **Strophomenidæ.**

Genus Ptychoglyptus Willard, 1928.

This genus was defined by Willard * in 1928 as "Rafinesquininæ allied to *Rafinesquina*, in which the thin shell is thrown into numerous transverse rugæ which are confined to the spaces between the principal striæ, and are not continuous, concentric folds, as in *Leptæna*. Type: *Ptychoglyptus virginiensis*, sp. nov."

The type was described from the Holston Limestone [Ordovician] of Virginia.

Ptychoglyptus pauciradiatus Reed. (Pl. VIII. fig. 3.)

1932. Reed, Skrift. Norsk. Videns. Akad. Oslo, I. Math. Nat. Kl. no. 4, p. 122, pl. xviii. figs. 1, 2.

Lectotype (here chosen).—Specimen from Hovin Sandstone, Grimsåsen, Trondheim district, Norway, figured F. R. C. Reed, 1932, *loc. cit.* pl. xviii. fig. 1.

Ptychoglyptus pauciradiatus was founded on specimens from the Hovin Sandstone of the Trondheim area, Norway. These specimens were compared with M'Coy's species *Strophomena undulata* from Ireland, but it was found that (Reed, 1932, p. 122) "in this Norwegian form the radial lines which divide up the surface of the shell into triangular areas are finer and much fewer in number than in the Irish species, numbering only 6 or 7 instead of about 16 as M'Coy states. Otherwise the shells seem to be almost identical. The concentric rugæ are rounded and generally continuous, though angulated at the radial lines, and there is a fine radial lineation over the whole surface."

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* **Willard, Bull. Mus. Comp. Zool. Harvard, lxviii. no. 6, p. 283.**

Willard (1928) compared the present author's *Rafinesquina ? subarachnoidea* from Girvan and *Strophomena arachnoidea* Tornquist with his species *Ptychoglyptus virginiensis* from the Holston Limestone of Virginia, but neither of the latter is closely allied to the Hovin species.

The relations of *Ptychoglyptus pauciradiatus* to other species were discussed in 1932. We may now add that *Leptæna sinuosa* Kindle * from the dolomitic limestone (Silurian) of Manitoba is an allied form.

The present Girvan specimens (Brit. Mus. BB 6106–7) are small and only two in number, but exhibit distinctly the peculiar characters of the species.

Dimensions of figured specimen (BB. 6106).—Width (along hinge-line) 5 mm., length 2·5 mm.

Horizon.—Caradocian ; Balclatchie Beds.

Locality.—Balclatchie, near Girvan, Ayrshire.

PELECYPODA.

Family **Grammysiidæ**

Genus CUNEAMYA Hall and Whitfield, 1875.

Cuneamya agnesæ, sp. n. (Pl. VIII. figs. 4 *a*–*b*.)

Description of Holotype.—Shell transversely elongate, oblong ; dorsal and ventral margins parallel ; anterior and posterior ends broadly rounded, of equal height ; umbones broad, subterminal, directed forwards, rising a little above hinge-line, incurved ; lunule well defined ; umbonal ridge subangular, diagonal, prominent, slightly sigmoidal, broadening and becoming lower towards posterior basal angle, marking off large flattened or gently concave triangular dorsal area above it ; greater part of side of valve concave in front of and below umbonal ridge, but with a weak broad rounded ridge running down vertically from umbo to anterior basal angle and a narrow shallow depression in front of it. Surface of shell marked with nearly equal, low, rounded, concentric rugæ, covered with numerous equidistant, closely set, regular, fine, concentric, thread-like lines; the latter bearing minute equidistant granules elongated along them and arranged locally in radial rows across the surface of the shell, giving the appearance of radial striation.

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* Kindle, Mus. Bull. no. 21 (Geol. Surv. no. 30), Geol. Surv. Canada, 1918, p. 13, pl. i. figs. 1–4.

Dimensions of Holotype.—Length 21 mm., height 10 mm.

Horizon.—Caradocian, Balclatchie Beds.

Locality. – Balclatchie, near Girvan, Ayrshire.

Holotype.— Specimen in the Mrs. Robert Gray Collection, British Museum (Nat. Hist.) [PL. 295].

Remarks.—There is only one specimen of this species of lamellibranch, and it consists of a left valve with part of the anterior ventral margin broken and the lower part of the anterior margin hidden in matrix. The ornamentation is beautifully preserved. We may compare it with species of *Cuneamya*, especially with *C. oblonga* Ulrich * from the Galena Limestone, for shape, rather than with any species of *Grammysia*, *Cypricardia*, or *Orthodesma*. The ornamentation of *Rhytimya granulosa* Wilson † from the Lorraine Formation of Ottawa district somewhat resembles it.

The specific name *agnesæ* given to this lamellibranch is in memory of Miss Agnes Gray, who was an assiduous collector of Girvan fossils for many years, and to whose efforts we owe much of the material available for study.

GASTROPODA.

Family **Acmaeidæ.**

Genus Archinacella Ulrich and Scofield, 1897.

Archinacella cf. *prendergasti* Reed.

(Pl. VIII. fig. 5.)

Description.—A capuliform elliptical shell, showing an excentric slightly incurved submarginal apex and concentric growth-lines and ridges on the surface; may be compared with the gastropod from the Redhill Beds (Ashgillian) of Haverfordwest described by the author as *Archinacella prendergasti* sp. n.*, and it may be regarded as allied to several species from the Ordovician in America, especially *A. cingulata* Ulrich † and *A. powersi* Ulrich ‡.

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* Ulrich, "Lower Silurian Lamellibranchiata of Minnesota" (Palæont. Minnesota, vol. iii. 1894), p. 623, pl. xxxvi. figs. 40, 41.

† Wilson, 'Ottawa Naturalist,' vol. xxi. no. 8, p. 85, pl. ii.

Dimensions.—Length 17 mm., width 14 mm., height 6 mm.

Horizon.—Ashgillian; Drummuck Group. Starfish Bed.

Locality.—Thraive Glen, near Girvan, Ayrshire.

Material.—One external mould in the Mrs. Robert Gray Collection at the British Museum (Nat. Hist.) [PG. 752].

Archinacella ? porifera, sp. n. (Pl. VIII. figs. 6 *a–c*.)

Description of Holotype.—Shell subovate, slightly widening towards the front, gently convex; apex small acute, raised, slightly incurved towards posterior end, very excentral, being situated only a short distance within posterior margin; subapical region concave; surface of valve bearing pair of low weak narrow divergent ridges making an angle of about 60°, with faint traces of several weaker additional ridges on lateral slopes. Shell thin, ornamented with numerous minute circular or hexagonal pits of equal size arranged quincuncially in regular concentric rows and numbering 22–24 in every 5 mm.

Dimensions of Holotype.—Length 35 mm., width (max.) c. 30 mm.

Horizon.—Caradocian; Balclatchie Beds.

Locality.—Ardmillan, near Girvan, Ayrshire.

Holotype.—Specimen in the Mrs. Robert Gray Collection at the British Museum (Nat. Hist.) [PG. 751].

Remarks.—The generic reference of this species is rather uncertain, but it seems to belong to the genus *Archinacella*. There is only one specimen of it and it is not quite perfect, but the shape of the shell and the position and curvature of the apex are distinct, and the ornamentation, which suggests that of *Trematis* and *Porambonites*, is beautifully preserved in places. We may mention that closely similar ornamentation is present in *Bucania punctifrons* Emmons *. The two divergent ridges on the surface do not seem due to crushing and can hardly be regarded as accidental. We may perhaps compare *A. gigantea* Koken † from Stage D 3 in Esthonia or *A. approximans* Perner ‡ from Stage 4 *d* near Christiania (Oslo).

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* Reed, 'Geological Magazine,' n. s. dec. v. vol. iii. 1906, p. 362, pl. xx. figs. 8, 8 *a*, 9.

† Ulrich and Scofield, Final Rept. Geol. Nat. Hist. Minnesota, vol. iii. 1897, pt. 2, p. 829, pl. lxi. figs. 1, 2.

‡ *Ibid.* p. 829, pl. lxi. figs. 3–5.

TRILOBITA.

Family **Raphiophoridæ**.

Genus AMPYX Dalman, 1827.

Subgenus AMPYXINA Ulrich, 1922.

Ampyx (*Ampyxina*) *pygmæa*, sp. n.

(Pl. VIII. figs. 2 *a–b*.)

Description of Holotype.—Glabella with strongly inflated oval subcarinate median lobe projecting in front nearly half its length beyond cheeks and provided with small short subcylindrical frontal spine and median tubercle; base of median lobe suddenly contracted and depressed into short neck having a small convex oval basal lobe on each side. Cheeks convex, obliquely triangular, wider than long, with pleuro-occipital ring marked off by strong furrow; meso-occipital ring convex, separated from glabella by deep furrow.

Dimensions of Holotype.—Width of head-shield at base 5·00 mm., length of head-shield to base of frontal spine 2·75 mm.

Horizon.—Caradocian; Balclatchie Beds.

Locality.—Balclatchie, near Girvan, Ayrshire.

Holotype.—Specimen in the Mrs. Robert Gray Collection at the British Museum (Nat. Hist.) [In. 37548].

Remarks.—This species, of which there is only one minute specimen, is allied to *A.* (*Ampyxina*) *aldonensis*

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* Ulrich and Scofield, "Gastropoda," Final Rept. Geol. Surv. Minnesota, vol. iii. pt. 11, 1897, p. 894, pl. lxvii. figs. 41–44.

† Koken, Gastrop. Baltischen Untersilurs, Mem. Acad. Sc. Russ. vol. xxxvii. no. 1 (1925), p. 279, pl. xxxix. figs. 1 *a*, 1 *b*.

‡ *Ibid.* p. 279, t. xxxvii. figs. 9, 9 *a*.

Reed[*] from the *Didymo. superstes* Shales of Aldons, and rather more closely to *A. acus* Troedsson [†] from the *Staurocephalus* Shales of Scania, but it differs from the former in its smaller lateral lobes and shorter but more laterally extended cheeks. *A. inflata* Cooper and Kindle [‡], from the Portage River, Quebec, has smaller and lower lateral lobes to the glabella.

Family **Proetidæ.**

Genus Proetus Sterninger, 1831.

Proetus vicinus, sp. n. (Pl. VIII. fig. 1.)

Description of Holotype.—Glabella subquadrate, slightly urceolate, being contracted across middle, longer than wide, narrowing slightly anteriorly, with rounded front end, gently convex, carinated by median ridge through entire length; basal lobes large, rounded to subtriangular, about a third length of sides, slightly projecting laterally at base, marked off by very faint fine oblique lateral furrows ending posteriorly in pits a short distance before reaching occipital furrow; anterior pair of lateral furrows faint, oblique, extending inwards about a third across glabella and arising at about two-thirds length of glabella. Occipital furrow strong, deep, curving forwards slightly at lateral ends. Occipital ring broad, ridged in middle like glabella. Surface of glabella crossed by very delicate fine sinuous transverse closely set lines.

Dimensions of Holotype.—Length of glabella and neck-ring 4·25 mm., width of glabella at base 3·25 mm.

Horizon.—Caradocian; Balclatchie Beds.

Locality.—Balclatchie, near Girvan, Ayrshire.

Holotype.—Specimen in the Mrs. Robert Gray Collection at the British Museum (Nat. Hist.) [In. 37547].

Remarks.—Only the glabella and occipital ring of this species are known. The ridged glabella, its contraction across its middle, and delicate linear ornamentation are its distinctive features. It resembles *P. subornatus*

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[*] Reed, Lower Palæoz. Trilob. Girvan, suppl. 3, 1935, p. 7, pl. i. fig. 23.

[†] Troedsson, Lunds Univ. Årsskr. N.F. Afd. 2, Bd. xv. no. 3, 1918, p. 75, t. ii. fig. 24.

[‡] Cooper and Kindle, Journ. Paleont. vol. x. no. 5, 1936, p. 362, pl. lii. figs. 21, 26.

Cooper and Kindle * from the Ordovician of Quebec in shape and ornamentation. It seems also to be somewhat like *Pr. zalesskyi* Öpik † from Stage C 2 in Esthonia, but the carination of the glabella is peculiar.

EXPLANATION OF PLATE VIII.

Fig. 1. *Proetus vicinus*, sp. n. Holotype. Imperfect cephalon (outline restored). × 8. Balclatchie Beds, Balclatchie. Brit. Mus. (Nat. Hist.) [In. 37547].

Fig. 2 *a*. *Ampyx (Ampyxina) pygmæa*, sp. n. Holotype. Complete cephalon : dorsal aspect. × 6. Balclatchie Beds, Balclatchie. Brit. Mus. (Nat. Hist.) [In. 37548].

Fig. 2 *b*. Ditto. Lateral aspect. × 6.

Fig. 3. *Ptychoglyptus pauciradiatus* Reed. External view of dorsal valve. × 9. Balclatchie Beds, Balclatchie. Brit. Mus. (Nat. Hist.) [BB. 6106].

Fig. 4 *a*. *Cuneamya agnesæ*, sp. n. Holotype. Imperfect left valve (outline restored). × 2. Balclatchie Beds, Balclatchie. Brit. Mus. (Nat. Hist.) [PL. 295].

Fig. 4 *b*. Ditto. Portion of surface. × 14.

Fig. 5. *Archinacella* cf. *prendergasti* Reed. Ventral aspect. Drawn from rubber-squeeze. × 1½. "Starfish Bed," Thraive Glen. Brit. Mus. (Nat. Hist.) [PG. 752].

Fig. 6 *a*. *Archinacella ? porifera*, sp. n. Holotype. Ventral aspect (outline restored). × 1½. Balclatchie Beds, Ardmillan. Brit. Mus. (Nat. Hist.) [PG. 751].

Fig. 6 *b*. Ditto. Lateral aspect. × 1½.

Fig. 6 *c*. Ditto. Portion of surface of valve. × 14.

XIII.—*Bupresti des nouveaux.*

Par A. Théry.

AGRILACANTHUS, gen. nov.

Tête verticale en avant, large, tuberculée ; épistome largement sinué ; joues obtusément dentée, cavités antennaires grandes et modérément rapprochées, surmontées d'un profond sillon s'élargissant contre le bord de l'œil. Antennes médiocres, dentées à partir du 4ème article, le 2ème article un peu plus long que le 3ème, les articles dentées munis d'une fossette porifère terminale, recouverte de villosité. Yeux moyens, elliptiques, très saillants, très écartés dans le haut. Pronotum plus large que long, bisinué antérieurement ; les côtés munis

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* Cooper and Kindle, Journ. Paleont. vol. x. no. 5, 1936, p. 364, pl. lii. figs. 16, 24.

† Öpik, Publ. no. 52, Geol. Instit. Univ. Tartu, 1937, p. 25, pl. i. figs. 1, 2, pl. iii. fig. 3.

de deux carènes rapprochées, soudées postérieurement ; la base fortement bisinuée ; le disque très inégal. Ecusson large, en forme de tête de clou. Elytres tronqués-arrondis au sommet et fortement denticulés le long de la troncature, à calus huméraux bien marqués et à dépression basale occupant toute la largeur de la base ; les côtés découvrant légèrement l'abdomen ; la suture rebordée. Bord antérieur du prosternum muni d'une mentonnière. Prosternum large, terminé postérieurement en pointe arrondie, apophyse non rebordée. Mesosternum divisé, ses branches courtes et formant en partie les cavités coxales intermédiaires. Mésosternum faiblement échancré en avant. Hanches postérieures faiblement dilatées au côté interne, étroites au milieu, très dilatées au côté externe avec l'angle postéro-externe saillant. Fémurs renflés échancrés sur le tiers antérieur, garnis au bord interne d'une double rangée d'épines dirigées vers l'extrémité ; tibias arqués ne pouvant s'appliquer complétement contre les fémurs, laissant un vide au sommet quand ils sont complètement contractés, légèrement aplatis transversalement, à bord externe tranchant : les postérieurs légèrement sinueux au bord externe et finement ciliés. Tarses médiocrement longs, les postérieurs ayant les 5–7 de la longueur des tibias, assez grêles, leur premier article ayant la même longueur que les deux suivants réunis ; les deux premiers légèrement comprimés, les suivants dilatés normalement ; tous les articles munis d'une lamelle, le premier seul avec une lamelle rudimentaire. Crochets fortement dentés, la dent interne plus robuste que l'externe et presqu'aussi longue. Corps allongé, assez convexe, densément pubescent. Le genotype est *A. lloydi* Théry.

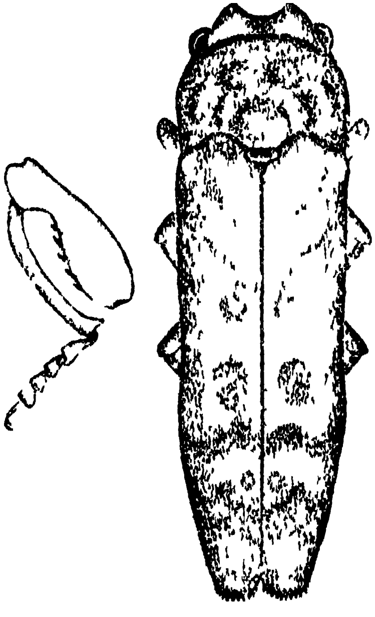
Je n'ai trouvé aucun caractère permettant de séparer sexuellement les trois individus décrits, ni dans la longueur des antennes, ni dans la forme du front, j'ai simplement constaté qu'un de ceux-ci paraissait avoir les tibias un peu plus fortement arqués et le dernier sternite un peu plus faiblement sinué, mais il est possible que ces différences ne soient qu'individuelles. J'ai renoncé à mutiler les exemplaires pour en déterminer le sexe. Ce genre a une grande affinité avec le genre *Agrilus*, mais s'en sépare nettement par un facies spécial, ses yeux très bombés et très saillants latéralement et surtout par ses fémurs armés de petites épines et la disposition des pattes semblable à ce qui existe dans le genre *Toxoscelus*.

Agrilacanthus lloydi, sp n. (Fig. 1.)

Long 10·5 mm , larg. 3·25 mm.

Bronzé, entièrement recouvert d'une pubescence formant des dessins clairs et voilant presque complètement le fond. Tête très large, plus large que le bord antérieur du pronotum, fortement sillonnée sur le vertex, le sillon se continuant en avant jusqu'au milieu du front, le fond du sillon lisse, brillant et finement strié. Côtés du sillon élevés en bosses recouvertes d'une forte pubescence très serrée et comme amalgamée leur donnant un aspect conique. Milieu du front avec deux tubercules pubescents placés sur une même ligne horizontale, au dessous desquels se trouve un autre sillon transversal à fond brillant, en forme d'accent circumflexe ce sillon surmontant

Fig 1.



Agrilacanthus lloydi, sp. n.

lui-même un petit amas de pubescence situé au dessus de l'épistome. Epistome séparé du front par une carène, au dessus de laquelle se trouve un petit sillon transversal superficiel. Yeux assez courts, leur bord antérieur incliné à 45°. Antennes courtes, ne dépassant pas, repliées le long du bord du prothorax, le milieu de celui-ci ; le 2ème article de la longueur du 1er, et à peine plus court que les deux suivants réunis. Pronotum très inégal, faiblement rétréci antérieurement, ayant sa plus grande largeur après le milieu, finement rebordé sauf tout à fait au milieu, les côtés faiblement arqués, rebordés d'une carène presqu'entière, un peu sinueuse, accompagnée d'une carène inférieure unie à la première à partir du quart postérieur et parallèle à celle-ci jusqu'au sommet ; les angles postérieurs largement obtus et arrondis ; la base anguleusement échancrée de chaque côté, avec un lobe médian largement tronqué. Disque déprimé au milieu, fortement déclive sur les côtés, avec un large sillon inégal derrière le bord antérieur, une très large dépression assez profonde devant l'écusson et un gros tubercule arrondi, de chaque côté, contre le bord, à hauteur du tiers postérieur, environ. La sculpture est formée de fines rides peu distinctes sous la pubescence, celle-ci est irrégulière et forme principalement deux taches bicolores dans le sillon antérieur. Ecusson grand, en forme de tête de clou, finement carèné, droit au bord antérieur. Elytres très faiblement sinuée entre l'épaule et le tiers postérieur où ils ont leur plus grande largeur (surtout du fait que l'abdomen les déborde sensiblement à cette hauteur), atténués en ligne presque droite, du tiers postérieur au sommet où ils sont brusquement tronqués arrondis, et irrégulièrement denticulés, sans angle sutural marqué. Epaules arrondies, avec une carène épipleurale obsolète ne dépassant pas la longueur du lobe épipleural. Disque impressionné longitudinalement la long de la suture sur la moitié de la largeur de l'élytre, cette dépression peu sensible sauf au sommet, et indiquée surtout par une fine ligne longitudinale de démarcation. Sculpture peu distincte sous la pubescence, celle-ci forme de vagues dessins gris et blancs en avant et notamment une petite tache arrondie de chaque côté de la suture, l'apex est taché de blanc et de roux doré et avant celui-ci il y a quelques grandes taches noirâtre formées par une pubescence plus espacée ne voilant pas le fond. Mentonnière courte, droite antérieurement. Prosternum densément pubescent, saillie prosternale large, à côtés subparallèles, subarrondie au sommet. Tibias antérieurs arqués, les médians et les postérieurs subdroits ; tarses postérieurs assez allongés, ayant les deux tiers de la longueur des tibias, leur 1er article à peu près de la longueur des deux suivants réunis.

N. NIGERIA : Azare, 1925, 3 ex. (*Dr. Ll. Lloyd*).

Type dans le British Museum ; un exemplaire dans ma collection.

Hylæogena bryanti, sp. n. (Fig. 2.)

Long. 2·6 mm. ; larg. 1·8 mm.

Ovalaire, noir, recouvert d'une pubescence d'un blanc argenté formant des dessins, notamment quelques taches noires, symétriques, glabres, une tache noire dénudée sur le calus huméral et particulièrement une grande tache circulaire, glabre, sur le milieu des élytres. Dessous noir, à pubescence grise courte et éparse.

Tête médiocre, déprimée en avant, fortement sillonnée. Cavités antennaires surmontées d'une coulisse allongée, se terminant dans un pore arrondi * ; épistome étroit, mais non réduit à une simple lame. Pronotum échancré en avant, assez régulièrement arqué latéralement, brusquement rétréci avant les angles postérieurs, profondément sinué de chaque côté, de l'écusson. Ecusson glabre. Elytres ayant leur plus grande largeur au milieu, régulièrement arrondis latéralement faiblement atténués postérieurement et conjointement arrondis au sommet.

BRÉSIL : São Paulo (*G. E. Bryant*).

Type dans le British Museum : 8 paratypes dans ma collection, provenant de la même localité.

Cette espèce a été abondamment répandue dans les collections, sous le nom de *Pachyschelus circumscriptus* Kerr., par M. Obenberger. Dans 'Sbornik,' 1925, p. 143, cet auteur rectifie le nom de *circumscriptus* et le remplace par celui de *bruchi* Kerr., qui n'est pas plus exact. Il suffit de lire la description de cette dernière espèce pour s'en rendre compte. *P. bruchi* a la tête et les côtés du pronotum d'un doré brillant, les élytres à villosité grise, peu dense, laissant, *autour de l'écusson* un vaste espace *semi-circulaire*, presque glabre, etc.

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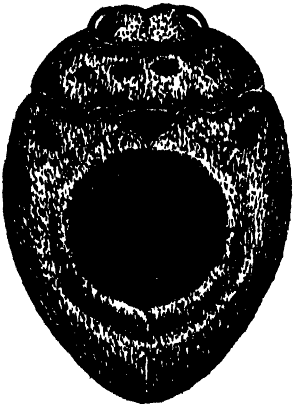
* Ces enfoncements que je nomme pores n'en ont sans doute que l'apparence d'après les observations de M. Obenberger (' Sbornik,' 1925, p. 5).

H. bryanti est voisin de *Pachyschelus ogloblini* Obb. de la République Argentine, mais ce dernier est un véritable *Pachyschelus*, ses carènes antennaires ne sont pas surmontées d'une coulisse, mais d'un simple pore, l'épistome est beaucoup plus large, le front est convexe, cependant à première vue les ♂♂ peuvent être facilement confondus. *P. ogloblini* se retrouve à Jatahy, Brésil (*Pujol*), mais Kerremans a confondu cette espèce avec *P. circumdatus*, espèce antérieurement décrite pas lui.

Fig. 2.



Hylæogena bryanti, sp. n.

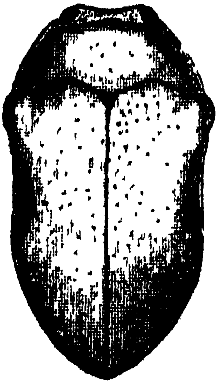
Neotrachys fennahi, sp. n. (Fig. 3.)

Long. 2·45 mm. ; larg. 1·4 mm.

Régulièrement ovale, médiocrement convexe, arrondi en avant et atténué en arrière ; dessus d'un bleu verdâtre foncé, à reflets cuivreux, glabre, brillant ; dessous noir.

Tête assez large, sinuée en avant, vue de dessus ; largement, transversalement et profondément déprimée au dessus de l'épistome, avec un pore frontal bien distinct situé de chaque côte au bord des cavités antennaires ; surface très finement et très densément granuleuse dans le fond, à ponctuation assez régulière formée de gros points devenant obsolètes vers l'épistome. Epistome large, fortement bombé, nettement séparé du front, très largement échancré en avant ; l'échancrure presqu' aussi large que la base du front. Front beaucoup plus large que haut, ses côtés divergents vers le vertex. Yeux blancs, sans pigmentation chez tous les exemplaires que j'ai vus. Pronotum modérément convexe, deux fois 1/2 aussi large que long, ayant sa plus grande largeur à la base. près deux fois aussi large à la base qu'en avant, les côtés très faiblement arqués, étroitement rebordés par une carène relevée en gouttière, avec les angles antérieurs aigus et émoussés au sommet, les postérieurs presque droits, vus perpendiculairement à leur plan ; bord antérieur largement bisinué, avec le lobe médian faiblement saillant, mais nettement indiqué. Base sinueuse, avec le lobe médian saillant et tronqué contre l'écusson. Surface modérément et assez régulièrement bombée, un peu déprimée dans les angles postérieurs. Disque extrêmement finement et densément granuleux, couvert d'une ponctuation éparse, assez régulière et un peu obsolète. Ecusson petit, triangulaire. Elytres modérément convexes, notablement plus larges aux épaules que le pronotum ; les côtés assez fortement sinués latéralement jusqu'après le milieu, puis rétrécis

Fig. 3.



Neotrachys fennahi, sp. n.

en courbe jusqu'au sommet, où ils sont conjointement et largement arrondis ; avec une carène marginale entière et relevée en gouttière sur sa partie antérieure. Chaque élytre avec une profonde dépression le long de la marge latérale, brusquement arrêté un peu avant le milieu de la longueur des côtés, la base légèrement déprimée de chaque côté, derrière le calus huméral, celui-ci très saillant. Surface brillante, couverte de points mal alignés et assez gros, formant des lignes longitudinales à peine distinctes ; ces points, vus à un fort grossissement, dorés dans le fond. Abdomen presque lisse, le 1er et le second sternites à suture invisible, même latéralement ; dernier sternite arrondi à l'apex. Métasternum couvert d'une ponctuation ombiliquée, obsolète, donnant naissance à de très petits poils blancs à peine distincts, son bord antérieur largement échancré. Bord antérieur du prosternum légèrement déclive sur les côtés. Saillie prosternale très large, élargie derrière, les hanches antérieures, arrondie au sommet. Pattes grêles ; crochets lobés.

ANTILLES : Sainte Lucie, iii. 1939 (*R. G. Fennah*).

Décrit d'après une série de 8 exemplaires capturés sur des Fougères.

Type dans le British Museum.

La ♀ est relativement plus large, ses dimensions sont : long. 2·55 ; larg. 1·55 mm. Son pronotum est plus doré.

Cette espèce appartient sans aucun doute au genre *Neotrachys* dont le génotype est *N. strandi* Obb.

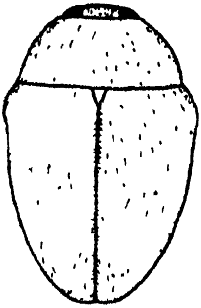
Les caractères du genre *Neotrachys*, tels qu'ils ont été donnés demandent à être modifiés ; il est très voisin de *Trachys* et en diffère par les caractères suivants :—Saillie prosternale beaucoup plus large, absence de plaque épistomale finement striée ; pronotum et élytres rebordés par une carène creusée en gouttière. L'auteur dit que les antennes sont dentées à partir du 6ème article, je crois que c'est une erreur, chez *N. fennahi*, et chez *N. guadeloupensis* elles ne le sont qu'à partir du 7ème.

N. fennahi se distingue des autres espèces du genre de la façon suivante ; *N. guadeloupensis* Fleut. & Sallé, d'une longueur de 2·2 mm., et est d'un cuivreux clair et ses élytres ne sont pas rétrécis dès la base. *N. hoffmani* Fish., de Porto-Rico, à 3 mm. de longueur et 1·5 de largeur, il est donc 2 fois aussi long que large et seulement 1½ chez le ♂ de *N. fennahi* et 1¾ chez la ♀ du même ; le corps n'est pas brillant, mais sub-opaque. *N. strandi* Obb., de Costa Rica, a également 3 mm., le corps est plus de 2 fois aussi long que large et les pores frontaux sont indistincts. Les antennes seraient dentées à partir du 6ème article. *N. jakowlevi* Obb. qui se trouve en même temps à Costa Rica et en Bolivie est encore plus grand, 3·2 mm., et sa coloration est nettement bicolore.

Paratrachys bengalensis, sp. n. (Fig. 4.)

En ovale large, recouvert d'une pubescence un peu laineuse, modérément dense et ne cachant pas le fond ; cette pubescence formant des taches variables d'un blanc argenté sur un fond d'un roux un peu doré, les taches sont mal limitées sur les bords et se fondent avec la couleur foncière.

Fig. 4.



Paratrachys bengalensis, sp. n.

Cette nouvelle espèce ressemble à *P. hederæ* Saund. (*hypocrita* Fairm.), décrite du Japon, mais qui se retrouve en Indo-Chine et sans doute en Chine, mais chez cette dernière espèce, les taches blanches paraissent mieux delimitées parcequ'elles sont situées sur un fond de pubescence noire complètement indistincte, si on ne regarde pas l'insecte de profil.

Tête large, dépassant notamment la moitié de la largeur du pronotum à la base, très faiblement convexe, presqu' indistinctement ponctuée au sommet, densément et finement ridée à la base du front, les rides transversales et arquées vers l'arrière. Epistome très large, très court et très faiblement sinué. Front à côtés subparallèles, ayant environ les 2/3 de la largeur de la tête, à pubescence rare, régulière et divergente. Yeux grands, en partie cachés. Antennes très courtes dentées à partir du 6ème article. Pronotum deux fois et demi aussi large que long, ayant sa plus grande largeur à la base, fortement rétréci en avant, tronqué antérieurement, arrondi sur les côtés, la base formant une courbe régulière avec les angles postérieurs un peu aigus et légèrement saillants en arrière. Disque obsolètement ponctué, sans aucune impression, la pubescence entremélée de quelques poils blancs formant une tache de chaque côté contre la base. Ecusson grand, triangulaire, uni, plus long que large. Elytres un peu plus larges que le pronotum, à calus huméral peu saillant, rétrécis en courbe de plus en plus accentées de l'épaule à l'apex où ils sont conjointement arrondis. Disque parcouru par les lignes obliques de points assez forts, réguliers dans la région scutellaire, mais devenant plus ou moins embrouillés sur le reste de l'élytre ; toute la surface unie, sans impressions autres qu'un étroit sillon marginal entier et d'un autre sillon, subparallèle au premier, mais droit commençant sous l'épaule et se prolongeant jusqu'a un peu au delà de l'extrémité du lobe épipleural. Dessous assez faiblement sculpté, recouvert d'une pubescence blanche molle assez longue et espacée. Bord du prosternum droit, la saillie prosternale très large, légèrement étranglée entre les hanches antérieures, élargie et tronquée au sommet. Tarses bruns.

INDES ORIENTALES : Pusa, viii. 1929 (*Haq.*).

Décrit d'après un unique exemplaire communiqué par "The Imperial Institute of Entomology" et déposé dans le British Museum.

Cette espèce mine à l'état de larve, les feuilles du *Ficus bengalensis*, c'est la première du genre signalée de la faune Indienne, c'est aussi la première dont la biologie est connue.

Le genre *Paratrachys* bien que très éloigné des Trachyni, aurait donc des mœurs analogues, il serait très intéressant que les entomologists indiens veuillent bien en rechercher la larve qui sans doute doit différer de celle des Trachyni. Il y aurait là une étude des plus intéressantes à faire.

XIV.—*On some Fishes of the Genus* Acanthophthalmus, *with Description of a new Species.* By A. FRASER-BRUNNER.

DURING the last few years certain striped loaches of the genus *Acanthophthalmus* Bleeker have been very popular among aquarium-keepers, and I have had an opportunity of examining a number of specimens, both in life and after preservation. These were all imported and sold under the name *Acanthophthalmus kuhli*, but examination left no doubt in my mind that several species were represented among them. In consequence, I enlisted the aid of two of the foremost dealers, Messrs. A. H. Boughton and D. Pope, and succeeded eventually in obtaining specimens of each of the varieties with verified locality data. Upon this material, and that in the British Museum (Natural History), this paper is based.

Three species are found to be represented—the original *A. kuhlii* (C. & V.) from Sumatra and Java, and *A. shelfordi* Popta from Borneo, both of which appear to be rare, and one from the Malay Peninsula here described as a new species, which is, curiously, more common than the others and most frequently seen in the aquarium. It seems likely that, when these fishes are better known, each island in the Malay Archipelago will be found to have its own species, subspecies, or race belonging to this group.

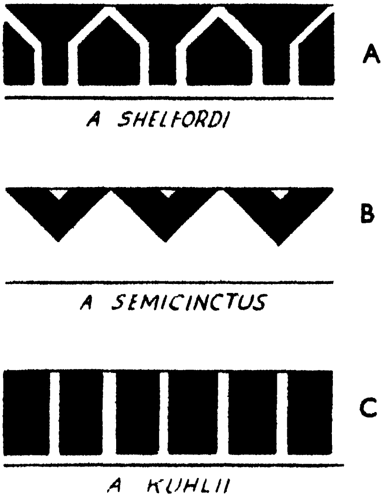
The patterns of these species are their most readily noticeable feature, and may be shown schematically as in fig. 1. It will be seen that *A. semicinctus* has tapering patches confined to the upper half of the body; *A. shelfordi* has similar patches, but they extend lower and have a second row between them; while *A. kuhlii* has less tapering or parallel bands in a single series, extending well down the side. Despite considerable individual variation, this basic plan appears to be constant for the species.

In addition, these fishes are distinguishable as follows:—

I. Head 6½ in length. Pelvic fins in middle of length of fish (including caudal fin). Dorsal fin II 6.
  A. Anal fin well behind dorsal. Patter as fig. 1, A. .. *shelfordi*.
  B. Anal fin commencing immediately below end of dorsal. Pattern basically as fig. 1, B......... *semicinctus*.

II. Head about 8 in length. Pelvic fins well behind middle of length of fish. Dorsal fin II 7–8. Anal fin commencing slightly behind end of dorsal. Pattern basically as fig. 1, C.................... *kuhlii.*

Fig. 1.



Schematic representation of basic patterns in three species of *Acanthophthalmus*.

Acanthophthalmus shelfordi.

Acanthophthalmus shelfordi Popta, 1901–3, Notes Leyden Mus. xxiii. p. 231 ; Weber and Beaufort, 1916, Fish Ind. Austr. Arch. iii. p. 32, fig. 14.

Acanthophthalmus kuhlii Arnold and Ahl, 1936, Fremdl. Süsswasserfische, p. 223 (part.), fig.

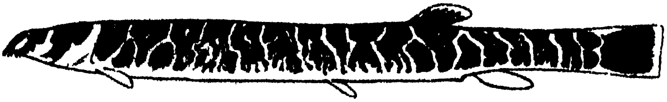
Depth of body contained 8–9 times in the standard length, length of head 6½ times. Diameter of eye contained about 9 times in length of head, 3 or 4 times in snout. Six barbels, the maxillary pair the longest, half length of snout. Dorsal fin II 6, the distance from its origin to base of caudal contained 3 times in the standard length. Anal fin II 5, situated behind the dorsal fin at a distance about equal to its base. Pelvic fins I 5, situated in middle of length of fish (including caudal fin). Pectoral I 9.

Brownish or pinkish, with a dark patch on snout, another across eye and a third across operculum. A row of about 12 dark patches on back, extending irregularly down sides; between them, on lower part of side, a second row; none of the patches extending on belly. Dorsal and caudal fins with dark bands or almost completely dark.

Hab. N. Borneo.

Of this rare species we have a poorly preserved example received from the Sarawak Museum, and a good specimen, also from Sarawak, which I kept alive until recently. Its life colours consisted of the pattern of dark purple-brown patches as illustrated (fig. 2) on a golden-brown or yellow (variable) ground, the belly distinctly pink or mauve.

Fig. 2.



Acanthophthalmus shelfordi (× 1½).

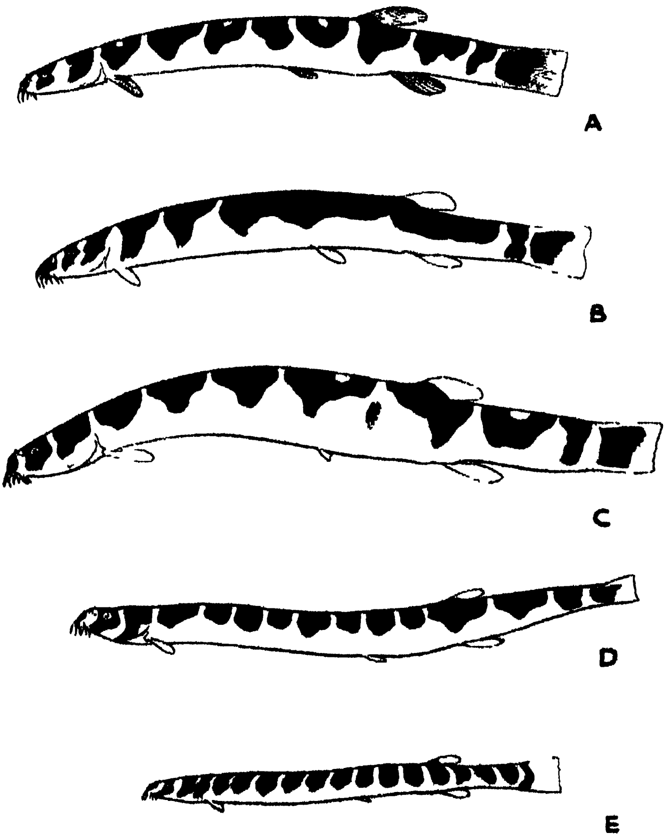
Acanthophthalmus semicinctus, sp. n.

Acanthophthalmus kuhli Ladiges, 1934, Tropical Fishes, p. 81, fig.
Acanthophthalmus kuhlii Innes, 1934, Exotic Aquarium Fishes, ed. ii. p. 205, fig; ? Arnold and Ahl, 1936, Frëmdlandische Süsserwasserfische, p. 223 (part.), fig.; Herre and Myers, 1937, Bull. Raffles Mus. xiii. p. 65 (not of Cuvier and Valenciennes, 1846).

Elongate, moderately compressed. Depth of body contained about 8 times, length of head 6½ times, in standard length. Diameter of eye contained 8 times in length of head, 3 times in that of snout. Snout obtuse, convex; lips thick, the lower bilobate. Six barbels, the rostral pair the longest, about half length of snout. Dorsal II 6, the distance from its origin to end of caudal peduncle contained 3 times in the standard length. Anal II 6, commencing immediately below posterior end of dorsal fin-base. Pelvic fins situated exactly in middle of length of fish (including caudal fin), each with 1 hard and 5 soft rays. Pectoral I 10.

Yellowish, with a series of broad transverse patches more or less confined to the upper half of the body, usually much wider above than below; the first three are on the head, as follows:—one at end of snout, before nostrils, one across eye, one across occiput extending on to gill-cover. On the body there are about 14 bars in the young (fig. 3, E), which later unite below to form 7 or 8 very wide patches, but often leave a pale median

Fig. 3.



Acanthophthalmus semicinctus (× 1½).

A, Holotype ; B, C, variations ; D, specimen with components of bands not fused on left side (right side similar to type) ; E, young example with components not yet fused.

spot on the back. The specimen D (fig. 3) is interesting in that on its right side the bands have fused and resemble those of A. There is much variation in the pattern, no two specimens being quite alike. Basal half of caudal fin with an asymmetrical black patch.

Hab. Malay Peninsula (Malacca, Johore).

Described from six examples, 33 to 54 mm. standard length; the type is a specimen 45 mm. long, from Mawai district, Johore, collected by Dr. Herre (Brit. Mus. Nat. Hist. 1938, 12.1.113). A much finer specimen, received from Dr. Arnold, is unfortunately accompanied by a label "Malay Peninsula or Sunda Is.," in view of which ambiguity it seems undesirable to use it as the type.

This species is very distinct from *A. kuhlii*, not only on account of its pattern but by reason of its stouter form, larger head and the position of the anal fin, which also distinguishes it from *A. shelfordi*.

At the time of writing there is a living example in an aquarium at the British Museum (Natural History). The ground-colour is coral pink, the bands nearly black, the spots on the back white, the whole effect being very brilliant. It is of retiring disposition, spending long periods motionless among the weeds, but can move with incredible rapidity at times. It appears to be omnivorous, foraging scraps from the sand by means of its barbels.

Acanthophthalmus kuhlii Cuvier & Valenciennes.

Acanthophthalmus fasciatus Kuhl, 1823, Alg. Konst.- en Letterb. II. p. 133 (no description).

Cobitis kuhlii Cuvier and Valenciennes, 1846, Hist. Nat. Poiss. xviii. p. 77; Bleeker, 1857, Nat. Tijds. Ned. Ind. xiii. p. 364.

Acanthophthalmus fasciatus Bleeker, 1860, Ichth. Arch. Ind. Prodr. ii. Cyprini, p. 74; 1863, Atlas Ichth. iii. p. 11.

Acanthophthalmus kuhlii Günther, 1868, Cat. Fish. Brit. Mus. vii. p. 371; Steindachner, 1901, Abh. Senckenb. Naturf. Gesellsch. xv. p. 455.

Acanthophthalmus kuhli Weber and Beaufort, 1916, Fish. Indo-Austral. Arch. iii. p. 33.

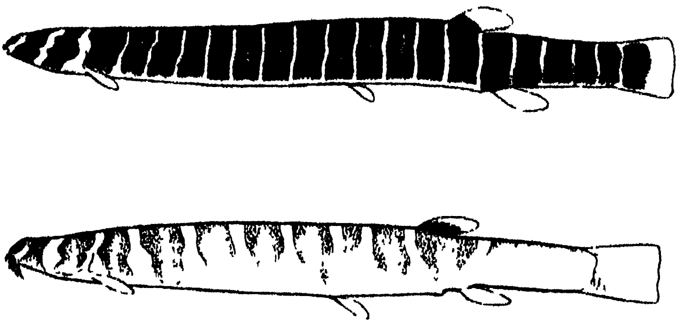
Depth of body contained 8–9 times in the length, head 8 times. Diameter of eye contained 8 to 11 times in length of head, 3 or 4 times in that of snout. Six barbels, the maxillary pair the longest, nearly as long as snout. Dorsal II 7–8, distance from its origin to base of caudal fin contained 3¼ to 3½ times in standard length. Anal fin II 7, situated slightly behind end of dorsal fin-base (distance about half width of base). Pelvic fins I 5, situated well behind middle of length of fish. Pectoral I 9–10.

A series of more or less regular transverse bands, extending right across the side, almost to the belly. They are paler in the centre than at the edges, or are distinctly paired. Three are on the head, as in *A. semicinctus*, followed by 12 to 17 on the sides of the body. Basal half of caudal fin black.

Hab. Sumatra; Java; ? Borneo.

The type-locality of this species appears to be Java, whence we have a specimen (fig. 4 A). Another example, from Bleeker's collection, represents what is evidently a subspecies from Sumatra; unfortunately the pattern is very faded, but appears to be much like that figured in his 'Atlas.'

Fig. 4.



Acanthophthalmus kuhli (× 1¼).

A. *A. k. kuhlii.* The barbels are lacking in this specimen.
B. *A. k. sumatranus*, type.

These two subspecies may be distinguished thus:—

I. Body, behind the head, with about 12 broad bands, narrowing somewhat below; Sumatra .... *A. kuhlii sumatranus*, [subsp. n.
II. Body, behind the head, with about 17 more or less parallel bands, each divided into a distinct pair by a pale line; Java ...... *A. kuhlii kuhlii.*

The type of the new subspecies is Bleeker's specimen, 60 mm. long, from Lahat, Sumatra (Brit. Mus. Nat. Hist. 66.5.2.41).

XV.—*Descriptions and Records of Bees.*—CLXXX.

By T. D. A. Cockerell, University of Colorado.

Halictus chloronotulus, sp. n.

♀.—Length about 4·6 mm., anterior wing 4.

Black, with the mesonotum appreciably dark greenish; mandibles black, flagellum red beneath, tegulæ small, very dark brown; hair of head and thorax very scanty; head broad, circular seen from in front; clypeus shining, with a median groove; supraclypeal area with a highly polished eminence; front dull, shining along orbits; mesonotum flattened on disc, shining but not highly polished, scutellum similar; area of metathorax rather large, dull and granular, the hind margin with two small shining marks, the microscope shows a very minutely tessellate surface, with rather more than the basal half showing very weak, well-separated, parallel plicæ; posterior truncation dull. Wings greyish hyaline, stigma dilute brown, nervures pale brown; second cubital cell rather narrow, receiving recurrent nervure a little before end. Legs black, with pale greyish hair; hind spur with a few long spines. Abdomen polished, without any hair-bands or spots, margins of tergites dark, there seems to be a very feeble greenish tint.

Cape Province: near Oudtshoorn, Oct. 1931 (*Cockerell*).

Halictus camphorellus, sp. n.

♀.—Length about or nearly 5 mm., anterior wing nearly 4.

Mainly black, but head rather long, and clypeus produced, the clypeus and supraclypeal area distinctly green, the front dark bluish; mesonotum dark greenish, and abdomen with very feeble greenish tints; mandibles black; flagellum obscurely brownish beneath; clypeus and supraclypeal area shining, front shining if seen obliquely from below; mesonotum shining but not highly polished, very minutely punctured; scutellum polished on disc; area of metathorax moderately large, dull, the hind margin shining in middle, the microscope shows a very minutely tessellate surface, with no distinct plicæ; posterior truncation dull; tegulæ black. Wings hyaline, stigma very pale reddish, nervures very pale, outer intercubitus and recurrent very weak, second cubital cell receiving recurrent nervure before end. Legs black, hind spur with few long spines. Abdomen shining, without hair-bands or spots, and margins of tergites not evidently discoloured; apex with copious pure white hair.

Cape Province: Doorn River, near Camfer, Nov. 1931 (*J. Ogilvie*).

Halictus cessulus, sp. n.

♀.—Length about 4·5 mm., anterior wing 3·8.

Black, with the mesonotum and scutellum faintly greenish, and the abdomen somewhat brownish, with the hind margins of tergites 2 to 4 narrowly pallid; hair of head and thorax scanty, but conspicuous and pure white on cheeks and sides of thorax; mandibles black, flagellum obscurely brownish beneath; head broad, but clypeus somewhat produced; clypeus shining, but not highly polished, supraclypeal area with a shining spot; front dullish; mesonotum and the small scutellum shining, the former with a distinct median groove; area of metathorax very large, dull, with the hind margin shining, the microscope shows very fine parallel plicæ, more or less united laterally; posterior truncation dull; tegulæ dark brown. Wings hyaline, stigma very pale reddish, nervures very pale; second cubital cell broad below, receiving recurrent nervure before end. Legs black, the hind tarsi long and slender, hind spur with few long spines. Abdomen rather narrow, shining, without hair-bands or spots.

S. Rhodesia: Shangani, De Beers Ranch, May 11–12, 1932 (*Alice Mackie*).

The last three small species may be separated, and compared with others, as follows:—

	Mesonotum olive-green; wings dusky	*chloronotus* Ckll.
	Mesonotum black or faintly metallic	1.
1.	Mesonotum pure black, dullish; sides of first two tergites with large but inconspicuous patches of greyish hair	*parapastinus* Ckll.
	Mesonotum more shining; first two tergites without such hair	2.
2.	Stigma very pale	2.
	Stigma brown or reddish	4.
3.	Larger; head oblong, clypeus produced; median groove of mesonotum faint	*camphorellus* Ckll.
	Smaller; head broad and short; median groove of mesonotum distinct	*dispositellus* Ckll.

4. Third tergite with a conspicuous pallid margin; posterior truncation of thorax dull .... *cessulus* Ckll.
Third tergite without a pallid margin .... 5.
5. Very minute, wings dusky, abdomen with conspicuous white hair at apex. (Katanga.) .. *angustulus* Ckll.
Larger .... 6.
6. Posterior truncation of thorax shining; mesonotum hardly greenish: head narrower; area of metathorax longer. (Katanga.) ... *epichlorus* Ckll.
Posterior truncation of thorax dull; mesonotum distinctly greenish; head broader; area of metathorax shorter .... *chloronotulus* Ckll.

Halictus discretulus, sp. n.

♀.—Length about 5 mm., anterior wing 4.

Shining dark olive-green, not brassy as in the common species of *Seladonia*; hair of head and thorax very scanty, white; abdomen highly polished, broad, parallel-sided except at ends, with very thin white marginal hair-bands on tergites 3 and 4, but not on first two, apex covered with white hair; head broad, but clypeus rather prominent; clypeus shining, only the margin black; supraclypeal area with a highly polished, brassy, spot; front shining; mandibles black; flagellum brownish beneath; mesonotum and scutellum shining, very finely punctured, not polished; area of metathorax rather large, entirely dull, the microscope shows a minutely tessellate surface, with fine parallel plicæ, partly anastomosing, and no shining margin; the microscope also shows that the small punctures on mesonotum are widely separated; tegulæ rather large, dark brown. Wings hyaline, the stigma very pale yellowish, nervures practically colourless, second cubital cell receiving recurrent nervure before the end. Legs black, with whitish hair, hind spur with few long spines.

Natal: Greytown, Oct. 20, 1931 (*Alice Mackie*).

This is a *Seladonia* with greatly reduced hair-bands, which gives it a peculiar appearance; it is also without the brassy-green colour usual in the group. The abdomen is suggestive of *H. zimbabuicus* Ckll., but broader and more polished, and the stigma is much paler than in that species. Apparently *H. zimbabuicus* is closely related.

Halictus (Seladonia) subincertus, sp. n.

♀.—Length about 6 mm., anterior wing 4·5.

Robust, with a large round head, brassy green, with hair of thorax above faintly fulvescent; clypeus shining, strongly punctured, with less than apical half black; supraclypeal area polished; sides of face moderately shining; front dull, with a shining line down the middle; mandibles long and black; antennæ black; mesonotum and scutellum shining but not polished, the punctures of mesonotum dense and very distinct (wholly different from the condition in *H. discretulus*); area of metathorax large, dull, with a shining margin, the microscope shows the surface to be covered all over with fine irregular rugæ, the marginal region with excessively fine transverse striation; the thorax is rather small, about the same size as the head; tegulæ small, dark brown. Wings yellowish hyaline, stigma and nervures extremely pale; second cubital cell narrow, parallel-sided, receiving recurrent nervure before end. Legs with the knees pallid, the front tibiæ light red in front, and behind at each end, the other tibiæ at apex, and the tarsi, red, but the hind basitarsi somewhat dusky. Abdomen broad, brassy green, the tergites with well-developed apical hair-bands.

S. Rhodesia: Vumba, Umtali, May 23–26, 1932 (*J. Ogilvie*).

Related to *H. banalianus* Strand, but much smaller. It is also near *H. hotoni* Vachel, but apparently separable, that species having the area of metathorax smaller, crescentic, and the thorax without fulvescent hair. I have referred to *H. hotoni* specimens from Louis Trichardt (*J. Ogilvie*) and the De Beers Ranch (*L. Ogilvie*), but the species as I have it is variable, and later studies with more material may show that it is composite. A specimen from Merebank, Natal, Oct. 1931 (*J. Ogilvie*) is referred to *H. hotoni*, and also one (though the head is broader and shorter) from Weenen (*Thomasset*).

Halictus matabelicus, sp. n.

♀.—Length about 6 mm., anterior wing 5.

Robust, black, with thin dull white hair, tarsi red, the basitarsi somewhat dusky; head broad, but not very large, clypeus little produced; clypeus and supraclypeal area polished, the clypeus with large sparse punctures; mandibles black; flagellum dusky red beneath; front shining; mesonotum dullish, not at all polished, with a strong median groove, there are small punctures on a minutely tessellate surface, which is thinly but conspicuously hairy; scutellum little shining; postscutellum with a tuft of dense pale tomentum in middle; area of metathorax large, shining, abruptly truncate behind, and with very coarse parallel plicæ, which in the middle are confused and united, and before the apex is an arcuate transverse ridge; posterior truncation shining, sharply defined; tegulæ small, red. Wings hyaline, faintly dusky, iridescent, the stigma large, pale brown, nervures very pale; first recurrent nervure meeting intercubitus; second cubital cell square, third cubital rather small; hind spur with two very long spines. Abdomen broad, convex, moderately shining, the second and following tergites obscurely reddish on margin, and the first has a linear pale edge; no hair-bands or spots, but the surface is thinly and very delicately pruinose with short pale hair.

S. Rhodesia: Matopo Hills, April 17–30 (*J. Ogilvie*), May 1 (*C. P. Harvey*).

There is also one, with conspicuously dark stigma, from Shangani, De Beers Ranch, May 1932 (*L. Ogilvie*). In the red hind tarsi this resembles *H. farquhari* Ckll., which is much larger (9 mm.), with quite different sculpture. The general appearance is suggestive of *H. retigerus* Ckll., which has a quite different mesonotum, and light hair at bases of tergites.

Halictus ingogoensis, sp. n.

♀.—Length about 4 mm., anterior wing about 3·3 mm.

Pure black, except that the broad oval abdomen is slightly brownish; head broad, approximately circular seen from in front; mandibles red apically; flagellum dusky brown beneath; clypeus shining, with very strong punctures; supraclypeal area polished; sides of face shining, but front dull; mesonotum and scutellum shining, the latter polished on disc, with an opaque median line; under the microscope the mesonotum shows numerous strong punctures, and the scutellum has two clearly defined impunctate areas; area of metathorax large, dull, the microscope showing a densely rugulose and pitted surface, without plicæ; tegulæ small, dark brown. Wings dusky, stigma pale dusky brownish; nervures brown, outer recurrent and intercubitus greatly weakened; second cubital cell broad, receiving recurrent nervure at apical corner. Legs black, the small joints of tarsi brownish ; hind spur with three long dark spines. Abdomen shining, with well-developed pale greyish hair-bands on hind margins of third and fourth tergites, but not on first and second ; hair at apex slightly fulvescent.

Natal : Ingogo, alt. 4064 ft., March 1932 (*J. Ogilvie*).

Allied to *H. umtaliellus* Ckll., but more robust, with a much larger head. From *H. cessulus* Ckll. it is easily known by the broad abdomen, with bands as described. The head is very much larger than in *H. hypochlorinus*.

Halictus (*Seladonia*) *jucundiformis*, sp. n.

♀.—Length about 9 mm., anterior wing 5·2, width of head 2·5 mm.

Brassy green, including abdomen, head and thorax with thin hair, that on vertex very faintly yellowish ; apical part of mandibles red, flagellum bright red beneath ; head large and broad, rather broader than thorax ; second joint of maxillary palpi large and swollen ; clypeus with the apical half black, with a strong subapical transverse groove, basal half with coppery tints ; in the cotype the black is more reduced, and the upper part is green ; supraclypeal area shining ; front dull, with a shining median line ; cheeks large ; mesonotum shining brassy green on disc, median groove feeble ; scutellum dullish, shining in some lights, very densely punctured ; area of metathorax rather large, finely rugulose all over, not plicate ; tegulæ small, pale testaceous. Wings yellowish hyaline, stigma very pale reddish, nervures very pale ; second cubital cell broad, parallel-sided, receiving recurrent nervure before end. Legs largely black, but anterior tibiæ red in front, anterior and middle tarsi red, and hind tarsi with small joints red ; hind tibiæ densely hairy. Abdomen with bands of white tomentum at base and apex of second and third tergites, fourth covered with hair, and with a fringe of fine hairs, but no apical band ; sides of apex with white hair.

Cape Province : Nelspoort, alt. 3260 ft., Dec. 3 and 4, 2 ♀♀ (*J. Ogilvie*).

At first sight, this might be taken for the common *H. jucundus* Sm., but the banding of the abdomen is different, and the area of metathorax is shorter and more distinctly sculptured. There is thus some approach to the tropical *H. banalianus* Strand.

I find that there is in South Africa a series of species of middle-sized *Seladonia*, which may be separated (females) as follows :—

	Second and third tergites with bands at base as well as apex, or (*H. trichiurus*) on second only	1.
	Second and third tergites without bands at base	4.
1.	Fourth tergite with a strong hair-band	2.
	Fourth tergite without such a band	3.
2.	Larger, head broader	*duplocinctulus*, sp. n.
	Smaller, hair of abdomen very clear white	*niveocinctulus*, sp. n.
3.	Large, wings yellowish	*jucundiformis*, sp. n.
	Smaller, wings not yellowish	*trichiurus*, sp. n.
4.	Tegulæ dark ; median groove of mesonotum distinct. (Albertinia (*R. E. Turner*), Huguenot (*J. Ogilvie*).)	*pruinescens* Ckll., 1937.
	Tegulæ pale or red ; median groove of mesonotum not distinct	5.
5.	Bluish green	*pontificus*, sp. n.
	Brassy green	*pervirens*, sp. n.

Halictus (*Seladonia*) *trichiurus*, sp. n.

♀.—Length about 7 mm., anterior wing 4·7.

Differs from *H. jucundiformis* thus : much smaller ; face not nearly so broad ; mesonotum and scutellum olive-green, not brassy ; area of metathorax more sharply defined behind ; wings not yellowish ; abdominal bands weak, hair on abdomen faintly yellowish, not clear white, copious dingy hair at apex. The underside of abdomen is black ; the hind spur has about six long spines. The abdomen is brassy green. The bright brassy-green abdomen separates this from the generally similar *H. expertus* Ckll. 1916.

Cape Province : Kirstenbosch, Nov. 10, 1931 (*J. Ogilvie*).

Halictus (*Seladonia*) *duplocinctulus*, sp. n.

♀.—Length about 6·6 mm., anterior wing 5 mm.

Robust, dark olive-green, head and thorax with dull whitish hair, fulvescent on head and thorax above ; head broad (but not so broad as in *H. jucundiformis*) ; mandibles red in middle ; flagellum rather dusky red beneath ; clypeus shining, about the lower two-fifths black ; supraclypeal area shining, when the face is seen obliquely from below, the clypeus appears dullish and black, contrasting with the shining green supraclypeal area; front moderately shining; mesonotum dullish, the disc shining; scutellum shining, but not polished, very densely punctured; area of metathorax somewhat shining, unusually long, forming a broad triangle; tegulæ pale testaceous. Wings hyaline, with very pale stigma and nervures; second cubital cell broad; anterior tibiæ red in front, the others at apex, tarsi red, the hind basitarsi infuscated; hind spur with several long spines. Abdomen broad, dullish, the hair slightly fulvescent, not pure white; the second and third tergites have basal bands, the second to fourth apical; apex with pale hair, but not covered with shaggy hair as in *H. trichiurus*. The area of metathorax is finely reticulate.

Orange Free State: Bosrand, Afdeling Farm, March 30, 1934 (*J. Ogilvie*).

Halictus (Seladonia) niveocinctulus, sp. n.

♀.—Length nearly 7 mm., anterior wing a little over 4.

Olive-green, the disc of mesonotum yellower green, conspicuously more so than the scutellum; head circular seen from in front, clypeus little produced, a conspicuous beard of long hairs from beneath clypeal margin; clypeus convex, with about the lower two-thirds black, strongly punctured, the upper part green, very sparsely punctured; supraclypeal area appearing dullish seen from in front, but its lower part brilliantly shining seen obliquely from below; front somewhat shining, the region about and below middle ocellus shining pale green; mandibles dusky red, black at end; flagellum red beneath; hair of head and thorax short, entirely white; mesonotum and scutellum shining, but closely punctured, the scutellum not so densely as in *H. jucundiformis*, the punctures of two sizes; area of metathorax crescentic, sides below it shining, the sculpture of the area consists of very fine vermiform rugæ; posterior truncation shining; tegulæ pale rufo-testaceous. Wings clear hyaline, stigma and nervures very pale; second cubital cell receiving recurrent nervure well before end; anterior tibiæ entirely red, middle and hind pair with a large dusky mark, tarsi red. Abdomen shining, with pure white hair, a narrow apical fringe on first tergite, failing in middle, second with narrow apical and basal bands, third and fourth with fine thin hair all over, but third with basal and apical bands, fourth the same, but basal band faint, apical very strong, sides of apex densely covered with white hair.

S.W. Africa: Windhoek, alt. 5600 ft., Dec. 14, 1933 (*J. Ogilvie*).

Easily known from the last species by the pure white hair of abdomen. Other metallic species from this locality are *H. jucundus* Sm. and *H. capensis* Friese.

Halictus (*Seladonia*) *pontificus*, sp. n.

♀.—Length about 6·5 mm., anterior wing 5.

Olive-green or bluish green, the head and thorax not at all brassy, but the abdomen yellower green, pubescence dull white; head large and round; mandibles red in middle, flagellum red beneath; clypeus with more than the lower half black, the upper part pale green, shining; supraclypeal area dull and strongly punctured, except a shining band along the lower part; front dullish, a shining spot in front of middle ocellus, but no shining pale area such as in *H. niveocinctulus*; mesonotum and scutellum closely punctured, shining but not polished, scutellum punctured as in *H. jucundiformis*; area of metathorax crescentic but large, with fine wrinkled anastomosing rugæ, looking like Chinese characters; tegulæ light rufotestaceous. Wings hyaline, faintly yellowish, stigma and nervures very pale, second cubital cell broad. Legs with the knees, tibiæ, and tarsi mainly red, the hind tibiæ densely hairy, the front tibiæ blackish with a light yellow base, the middle tibiæ blackish except at ends, the hind tibiæ suffusedly dusky. Abdomen shining yellowish green, second and third tergites with weak apical hair-bands, fourth thinly hairy all over, the hairs long, the hind margin pallid.

Orange Free State: North Bank Halt, Norval's Pont, April 12, 1934 (*J. Ogilvie*).

The mere colour differences would hardly suffice to separate this from *H. pervirens*, but in the latter the area of metathorax is much smaller (more narrowly crescentic), with a conspicuous raised thickened rim as seen from above. The face is not nearly so broad as in *H. duplocinctulus*.

Halictus (*Seladonia*) *pervirens*, sp. n.

♀.—Length about 5·5 mm., anterior wing 4·2.

Robust, brassy green, the thorax dullish, abdomen shining, pubescence rather dull white; head broader than long; upper part of eyes emerald green in type (but eyes all black in cotype); clypeus with lower half black, upper half light green, rather closely punctured; sides of face glistening, no shining area about ocelli; mandibles pale reddish in middle; flagellum red beneath; mesonotum dull and closely punctured, moderately shining on disc; scutellum dull, with fine close punctures; area of metathorax narrowly crescentic, with a raised shining margin, the microscope shows dense fine vermiform rugæ, and delicate transverse striæ in apical region (as in *H. expertus* Ckll.); tegulæ hyaline. Wings hyaline, with very pale stigma and nervures; second cubital cell rather narrow, receiving recurrent nervure a little before end. Legs with tibiæ and tarsi largely pale reddish, but the tibiæ with large black areas, in the middle pair leaving only the ends red, hind basitarsi with a dusky stain. Abdomen with apical dull white hair-bands on tergites 2 to 4; sides of apex with white hair.

Cape Province: Huguenot, Feb. 5–10, 1932 (*J. Ogilvie*). Also co-types from Bot River, Nov. 7, 1933 (*J. Ogilvie*).

Differs from *H. subincertus* Ckll. by having areas of metathorax much shorter, crescentic, and flagellum largely red beneath.

H. diductus Ckll., which was taken by the Ogilvies at Upington, falls near *H. duplocinctulus*, but the latter has a longer and more coarsely sculptured metathoracic area.

Hesperapis nanula Cockerell, 1936.

This was described from the male. R. E. Turner collected a long series, of both sexes, at Okahandja, S.W. Africa, and the female, which is about 5·3 mm. long, has the abdomen clear red, with dark marks at extreme sides of tergites. The flagellum is short and entirely red. The spur of middle tibia is straight and simple. The species is Turner's no. 26.

XVI.—*Études sur quelques* Scydmænidæ *de Bornéo et des Îles Fiji*. Par Jean Lhoste.

Parmi les Scydmænidæ de Bornéo et des Îles Fiji communiqués par Sir G. A. K. Marshall, six espèces ont pu faire l'objet d'une étude spéciale. C'est le genre *Scydmænus* Latreille qui est le plus abondamment représenté avec cinq espèces, le genre *Stenichnus* Thoms. n'en comprenant qu'une seule.

Provenant de régions peu connues tous ces insectes présentent un vif intérêt. En ce qui concerne le sous-genre *Scydmænus* (s. str.) deux espèces nouvelles sont très remarquables par l'allongement exagéré de leurs antennes et mériteront les noms de *Scydmænus* (s. str.) *vasticornis*, sp. n., et de *S.* (s. str.) *gracilicornis*, sp. n. Il est probable que cette structure antennaire répond à des conditions biologiques précises qui malheureusement ne nous sont pas connues.

Deux autres espèces se reconnaîtront aisément par la forme particulière des fémurs postérieurs des mâles, ainsi que le montrent les figures 12 et 14. La première de ces deux espèces prendra le nom de *S.* (s. str.) *taveuni*, nom de son pays d'origine, la seconde est le *S.* (s. str.) *hebridensis*, décrit en 1938 * des Nouvelles Hébrides. Les individus que nous avons maintenant proviennent des Îles Fiji à l'ouest des Nouvelles Hébrides, en plein océan pacifique. Je rappelerai que cette espèce est très voisine de *S.* (s. str.) *regularis* Schauff. qui peuple de nombreuses îles de l'Océan Indien ainsi que l'Indochine française. De nouveaux documents permettront certainement de mieux comprendre et de résoudre le problème geographique posé par les deux espèces *S.* (s. str.) *regularis* et *S.* (s. str.) *hebridensis*.

Une dernière espèce de *Scydmænus* appartenant au sous-genre *Eustemmus*, le *S.* (*E.*) *matangensis*, sp. n., ne présente qu'un intérêt purement systématique, ses caractères externes sont peu apparents et seule l'étude de l'organe copulateur mâle permet de le différencier des autres espèces voisines.

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* 'Revue française d'Entomologie,' 1938, p. 97.

Enfin je signalerai un nouveau *Sternichnus* du sous-genre *Cyrtoscydmus*, le *S.* (*C.*) *sarawakensis*, sp. n., qui est le premier décrit de Bornéo.

Passons maintenant à la description détaillée des espèces.

I. Genre STENICHNUS Thoms.

Stenichnus (*Cyrtoscydmus*) *sarawakensis*, sp. n.

Type au British Museum.

BORNÉO : W. Sarawak, Mont Matang, xii. 1913 (*G. E. Bryant*).

Long. 3 mm. Brun rouge clair. Ponctuation céphalique et prothoracique assez dense mais très superficielle et difficilement visible, élytres plus fortement ponctués. Pubescence dorée assez longue sur les bords du pronotum et surtout sur les élytres. Tête vaguement triangulaire avec sur la partie frontale une légère proeminence délimitée de chaque côté par un sillon peu profond ; yeux petits ; antennes relativement courtes avec l'article 3 plus long que le 2 et que le 4, les 4 et 5 égaux entre eux un peu plus longs que larges, les 6, 7 et 8 légèrement transverses, les 9 et 10 très fortement transverses, plus de deux fois aussi larges que longs, le 11 conique égalant en longueur les deux précédents. Pronotum convexes, plus long que large, très élargi au tiers antérieur de sa longueur, rétrécie à la base, celle-ci creusée de trois fovéoles arrondies, une autre fovéole plus petite orne chaque flanc prothoracique. Élytres régulièrement ovalaires près de trois fois aussi longs que larges, à calus huméral saillant. Pattes assez longues à fémur très renflés et à tibias grêles ; trochanters postérieurs munis d'un processus atteignant le tiers postérieur de la longueur du fémur (fig. 2). Appareil copulateur mâle allongé à pointe péniale obtuse, encadré de deux paramères porteurs de trois courtes soies (fig.1).

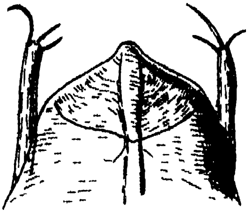
Cette espèce remarquable par le processus des trochanters postérieurs est très voisine de *S.* (*C.*) *wailimæ* de Sumatra.

II. Genre SCYDMÆNUS Latreille.

Pour faciliter la détermination des *Scydmænus* étudiés dans cette note je donnerai le court tableau dichotomique suivant :

1. Antennes dépassant de milieu de la longueur des élytres .... 2.

Antennes ne dépassant pas le milieu de la longueur des élytres .... 3.
2. Antennes plus longues que le corps .... *Scydmænus* (s. str.) *vasticornis*, sp. n.
Antennes moins longues que le corps ...... *Scydmænus* (s.str.) *gracilicornis*, sp. n.
3. Fémurs postérieurs modifiés chez les mâles. 4.
Fémurs postérieurs non modifiés chez les mâles .... *Scydmænus* (*Eustemmus*) *matangensis*, sp. n.
4. Fémurs armés d'une épine (fig. 14)........ *Scydmænus* (s. str.) *hebridensis* Lhoste.
Fémur en massue légèrement anguleuse (fig. 15)............................ *Scydmænus* (s. str.) *taveuni*, sp. n.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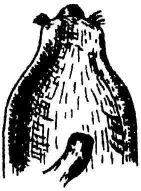
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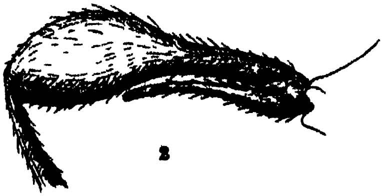
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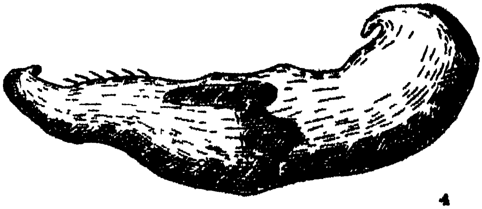
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Fig. 1.—*Stenichnus* (*Cyrtoscydmus*) *sarawakensis*, sp. n. Pointe péniale.
Fig. 2.—Fémur et trochanter.
Fig. 3.—*Scydmænus* (*Eustemmus*) *matangensis*, sp. n. Organe copulateur mâle.
Fig. 4.—Pointe péniale, vue de face.

Scydmænus (*Eustemmus*) *matangensis*, sp. n.

Type au British Museum.

BORNÉO : W. Sarawak, Mont Matang, 16, 30. i. 1914 (*G. E. Bryant*).

Long. 2 mm. Brun rouge assez foncé, brillant. Ponctuation nulle sur la tête et le pronotum, fine mais très dense sur les élytres. Pubescence courte et rare.

Tête légèrement transverse, yeux petits occupant les angles antérieurs. Antennes atteignant le bas du pronotum, assez grêles, mais avec l'article 11 oblong, très volumineux, un peu plus long que les deux précédents réunis, et plus large que le 10. Pronotum deux fois plus long que la tête et aussi large, subcylindrique ; base sans aucune trace de fovéoles. Élytres deux fois et demi aussi longs que larges, renflés vers le milieu, sans fovéole basale et avec un calus huméral saillant. Pattes de longueur normale, robustes.

Organe copulateur allongé, à pointe péniale (fig. 3) garnie de soies très fines à l'apex et de soies plus grosses vers l'arrière ; vue de profil la pointe péniale paraît recourbée sur elle-même (fig. 4).

Cette espèce porte peu de caractères importants. L'on notera la grosseur relative du dernier article antennaire —peut-être est-ce là un caractère sexuel secondaire, car je na'i vu qu'un mâle—et la structure de l'organe copulateur.

Nous rapprocherons la *S.* (*E.*) *matangensis* des *S.* (*E.*) *kombuisi* et *S.* (*E.*) *scydmænoides* respectivement de Java et de Sumatra.

Scydmænus (s. str.) *vasticornis*, sp. n.

Type au British Museum.

Bornéo : W. Sarawak, Mont Matang, 8. xii. 1913 et 16. i. 1914 (*G. E. Bryant*).

Long. 1·25 mm. Brun foncé, presque noir avec les antennes et les pattes beaucoup plus clair. Ponctuation invisible à un grossissement normal. Pubescence régulière, peu dense, jaune clair apparaissant bien sur la chitine foncée. Tête transverse avec sur sa ligne médiane une assez large dépression parcourant la moitié antérieure. Yeux moyens occupant les angles antérieurs. Antennes (fig. 8) plus longues que le corp, filiformes. Il est à remarquer, bien que l'allongement des articles soit considérable, que le rapport de leur longueur reste le même que celui des articles des autres espèces de *Scydmænus*. Pronotum un peu moins de deux fois plus long que la tête, à bords latéraux faiblement convexes : base prothoracique creusée de quatres petites fovéoles peu visibles. Élytres à peine deux fois plus longs que larges, convexes à bords externe régulièrement arrondi, fovéole basale et calus huméral peu marqués. Aile postérieure bien développée. Fémurs allongés mais encore robustes, tibias et tarses subfiliformes.

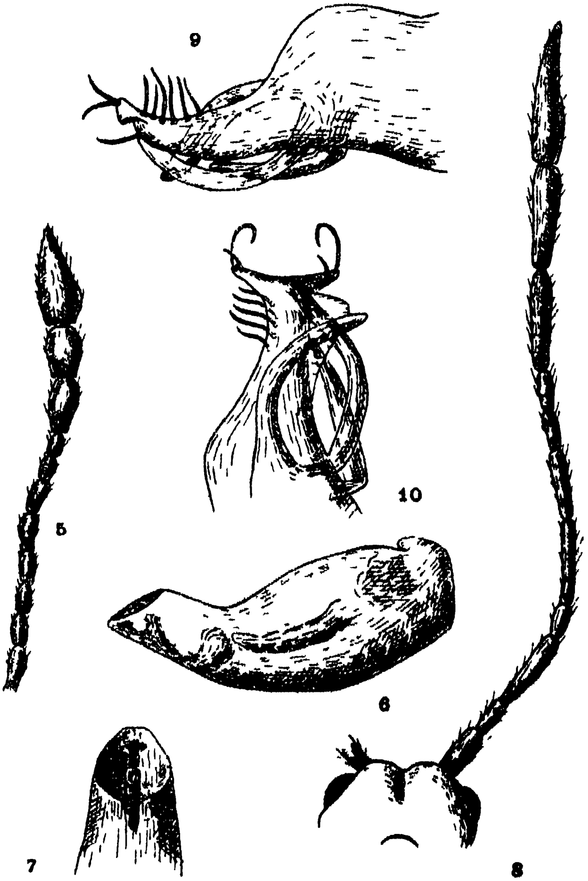

Fig. 5.—*Scydmænus* (s. str.) *gracilicornis*, sp. n. Antenne droite.
Fig. 6.—Organe copulateur, vu de profil.
Fig. 7.—Pointe péniale, vue de face.
Fig. 8.—*Scydmænus* (s. str.) *vasticornis*, sp. n. Tête et antenne droite.
Fig. 9.—Pointe péniale vue de profil.
Fig. 10.—Pointe péniale, vue de face.

Appareil copulateur mâle légèrement sinué, à pointe péniale très complexe (fig. 9 et 10).

Cinq individus de cette espèce si bien caractérisée nous sont connus. Les caractères les plus marquants de *Scydmænus vasticornis* : allongement des antennes et des pattes, grand développement des palpes maxillaires, élargissement des élytres, sont les caractères d'un insecte adapté sinon à la vie cavernicole tout au moins à la vie endogée. Mais d'autre part nous lui voyons des yeux encore bien développés et surtout une paire d'ailes membraneuses qui semblent fonctionnelles. Nous sommes donc en présence d'un insecte dont les caractères évolueraient avec des vitesses très variables. Ce fait est intéressant et méritait d'être mentionné. Quant à la structure de l'organe copulateur elle est tout à fait particulière et difficilement interprétable.

Scydmænus (s. str.) *gracilicornis*, sp. n.

Type de Penang, au British Museum.

FED. MALAY STATES : Penang, 2000 pieds d'altitude, 4. xii. 1913. SARAWAK : Kuching, 28. xi. 1913 (*G. E. Bryant*).

Long. 1 mm. Testacé avec les pattes et les antennes légèrement plus claires. Ponctuation invisible. Pubescence dorée peu dense et plus longue sur les élytres que sur la tête et le pronotum.

Tête transverse légèrement déprimée entre les antennes. Antennes grêles à peu près aussi longues que le corps de forme normale avec une massue bien individualisée (fig. 5) ; yeux réduits occupant juste l'angle antérieur de la tête.

Pronotum deux fois plus long que la tête légèrement plus large, à bords latéraux régulièrement arrondis ; fovéoles très petites au nombre de quatre, très difficilement visibles. Élytres deux fois et demie environ plus longs que larges à calus huméral peu saillant, fovéole basale à peine indiquée ; bord externe régulièrement arrondi. Ailé.

Pattes grêles et longues à tarses mâles non dilatés.

Organe copulateur mâle faiblement coudé, tronqué à l'apex (fig. 6 et 7).

Représenté par cinq individus le *S. gracilicornis* peut se rapprocher de *S. vasticornis*. En effet comme chez cette dernière espèce les antennes et les pattes s'allongent et les élytres se ramassent, toutefois cette tendance évolutive est beaucoup moins caractérisée ici que chez *S. vasticornis.* L'organe mâle est très simplifié et d'un type isolé.

Scydmænus (s. str.) *hebridensis* Lhoste.
(Figs. 14, 15, et 16.)

Ainsi que nous l'avons déjà dit, cette espèce, très voisine de *S. regularis* Schauff. fut décrite de Mallicolo (Nouvelles Hébrides) sur six exemplaires dont plusieurs mâles. Ces deux *Scydmænus* possèdent comme caractère sexuel secondaire mâle une robuste épine de taille différente selon l'espèce à la base du fémur postérieur (fig. 14). Nous avons maintenant en notre possession trois exemplaires de *S. hebridensis* des Îles Fiji, de Taveuni exactement, récoltés par Silvester Evans, le 4 mai 1924. La répartition de cette espèce semble grande et si nous réunissons les deux espèces voisines en une seule unité morphologique (*regularis-hebridensis*) nous voyons qu'elle couvre tout l'océan indien de la Réunion à l'Indochine française et une grande partie de l'Océan pacifique. La conclusion ne s'impose pas immédiatement mais nous y reviendrons ultérieurement.

Scydmænus (s. str.) *taveuni*, sp. n.

Type au British Museum.

Îles Fiji : Taveuni, 5. xi. 1923 (*Dr. Silvester Evans*).

Long. 1·3 mm. Brun clair. Aspect général massif. Faiblement et finement ponctué sur l'avant corps, plus grossièrement sur les élytres. Pubescence courte, ténue assez dense et régulière.

Mâle : tête volumineuse, transverse ; yeux oblongs assez gros ; antennes (fig. 11) à articles robustes, massue de trois articles bien indiqués, normale. Pronotum une demie fois plus long que la tête presque aussi large que long avec son maximum de largeur un peu en avant la moitié du bord latéral ; base creusée de quatre fovéoles arrondies bien visibles. Élytres deux fois et demie environ aussi longs que larges à bord externe régulièrement arrondi ; fovéole basale à peu près nulle, calus huméral peu saillant. Pattes courtes, tarses antérieurs non dilatés, fémurs postérieurs (fig. 12) très renflés et carénés.

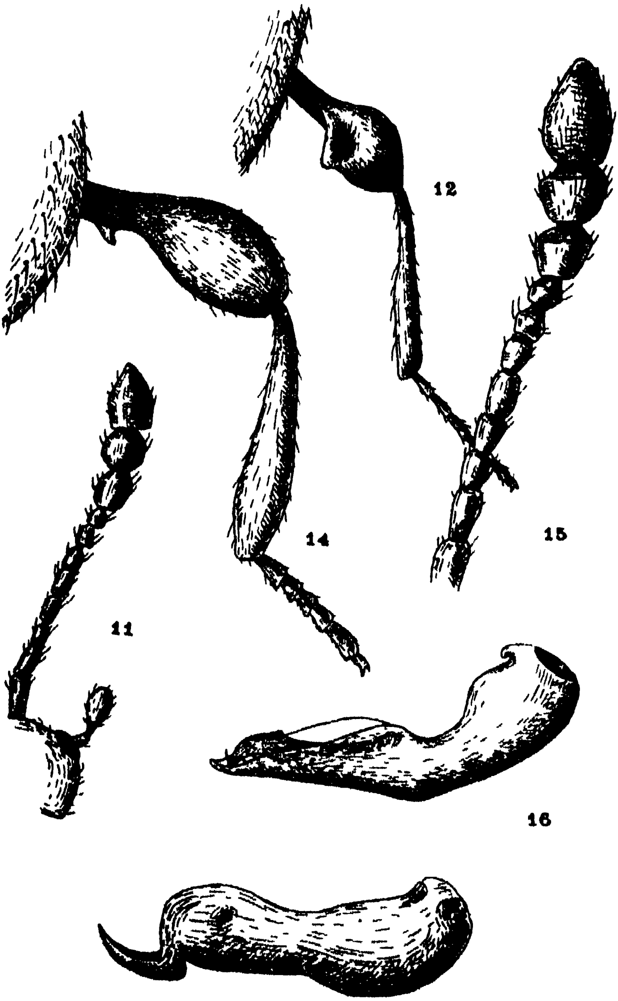

Fig. 11.—*Scydmænus* (s. str.) *taveuni*, sp. n. Antenne droite.
Fig. 12.—Patte postérieure droite d'un mâle.
Fig. 13.—Organe copulateur mâle, de profil.
Fig. 14.—*Scydmænus* (s. str.) *hebridensis*, sp. n. Patte postérieure droite d'un mâle.
Fig. 15.—Antenne droite.
Fig. 16.—Organe copulateur mâle, vu de profil.

Organe copulateur mâle allongé sans soie apparente et terminé par une pointe péniale acérée semblable à un bec crochu.

Femelle : les caractères généraux de femelles sont les mêmes. On peut noter toutefois un moins grand développement de la tête et naturellement l'absence de modification des fémurs postérieurs.

Cette espèce qui rentrera dans la lignée du *Scydmænus* (s. str.) *tarsatus* Müll. et Kunze est à rapprocher de *S.* (s. str.) *elegans* *. On note chez cette espèce une modification équivalente des fémurs postérieurs mâles et un appareil copulateur très voisin de celui de *S.* (s. str.) *taveuni*.

XVII.—*New or little-known* Tipulidæ (*Diptera*).—LVIII. *Neotropical Species*. By Charles P. Alexander, Ph.D., F.R.E.S., Massachusetts State College, Amherst, Massachusetts, U.S.A.

The crane-flies here considered are all from Ecuador, where most of the species were taken by Mr. William Clarke-MacIntyre and assistants. Additional specimens were included in material sent to me for identification by Mr. F. Martin Brown, Colorado Springs, Colorado, who has made extensive collections in Ecuador. I am greatly indebted to Messrs. Brown and MacIntyre for the opportunity of studying this interesting series, the types of which are preserved in my collection through the friendliness of the collectors.

Macromastix browni, sp. n.

General coloration of mesonotum dark brown, the præscutum light brown with the cephalic fifth more blackened ; frontal prolongation of head black ; antennæ, wings, and body all subequal in length ; antennæ 11-segmented, the terminal segment elongate ; flagellar segments without differentiated elongate verticils ; femora yellow, the tips narrowly blackened, remainder of legs

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* Mém. Mus. National d'Hist. Nat., nouvelle série, tome ix., mission scientifique de l'Omo, p. 110.

black; wings strongly infuscated, especially at tip, the basal portions, including cells *Sc* and Cu_1, yellow; a conspicuous cream-coloured spot in bases of cells R_3 and R_5; vein Sc_1 preserved; *Rs* shorter than R_{2+3}; abdomen yellow, the seventh and succeeding segments black.

Male.—Length about 10 mm.; wing 10 mm.; antenna about 10 mm.

Frontal prolongation of head black; nasus short and stout; palpi short, black. Antennæ as long as body or wing; basal three segments and proximal end of fourth yellow, the remainder black; flagellar segments long-cylindrical, without basal enlargements; segments with very abundant short erect verticils distributed throughout the entire length of segment; antennæ 11-segmented; first flagellar segment about three-fifths the second, succeeding segments progressively shortened, terminal segment about four-fifths the penultimate. Head yellowish brown, yellow pollinose; vertical tubercle low and simple.

Pronotum dark brown. Mesonotal præscutum light brown, the cephalic fifth, including the humeral region, more blackened: surface of præscutum sparsely pollinose, without distinct stripes; posterior sclerites of notum darker brown. Pleura brownish black, the pteropleurite with yellow pubescence, the ventral pleurotergite darker than the dorsal; dorsal sternopleurite a trifle brightened. Halteres relatively short, stem obscure yellow, knob brownish black. Legs with coxæ brownish black, the posterior pair a little brighter; trochanters obscure yellow, margined apically with dusky; femora yellow, the tips rather narrowly but abruptly blackened, including about the distal seventh or eighth of segment; tibiæ and tarsi black; claws simple. Wings strongly suffused with brown, especially the tip; about the basal half of wing more yellowish brown, the colour brightening to yellow in the prearcular field, cell *Sc*, base of cell *C*, and in cell Cu_1; extreme base of wing darkened; a conspicuous cream-coloured spot beyond cord in bases of cells R_3 and R_5; stigma oval, dark brown; cord very narrowly seamed with brown. Venation: Sc_1 preserved, ending opposite fork of *Rs*; *Rs* relatively long, spurred at origin, shorter than the straight R_{2+3}; R_2 short,

R_{1+2} preserved; petiole of cell M_1 a little longer than *m*; cell *2nd A* relatively wide.

Abdomen yellow, the seventh and succeeding segments black.

Hab. Ecuador.

Holotype, ♂, Macas, Rio Upano, altitude 1000 metres, January 24, 1939 (*Brown*).

Macromastix browni is named in honour of the collector, Mr. F. Martin Brown. The species is very distinct from all others described from Tropical America.

Tipula smilodon, sp. n.

General coloration reddish yellow, subnitidous, the præscutum with four conspicuous black areas; antennæ (male) elongate, basal flagellar segments bicoloured; wings with a brown tinge, cell *Sc* and the stigma darker brown; *Rs* short, less than *m–cu*; cell *2nd A* relatively wide; male hypopygium very large and conspicuous; eighth sternite produced caudad and dorsad into two powerful fang-like lobes that taper gradually to acute points.

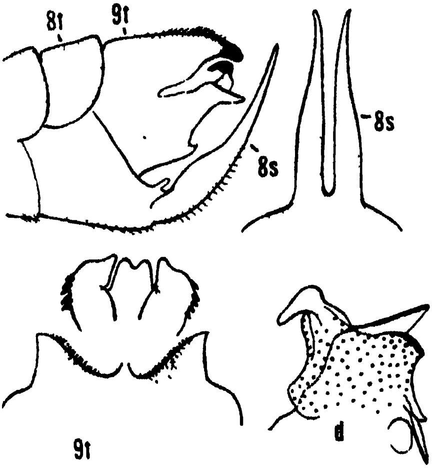
Male.—Length about 13–15 mm.; wing 12·5–13·5 mm.; antenna about 8–8·5 mm.

Female.—Length about 15–16 mm.; wing 13–13·5 mm.

Frontal prolongation of head yellow, relatively short; nasus short and blunt to virtually lacking; basal segments of palpi yellow, the terminal segment a little more darkened. Antennæ (male) elongate; scape and pedicel yellow, flagellum chiefly black, the more basal segments bicoloured, brownish yellow with darker basal enlargements; pedicel with a conspicuous brush of black setæ; flagellar segments weakly incised, verticils much shorter than the segments. Head brownish yellow vertical tubercle low.

Pronotum obscure yellow medially, blackened on sides. Mesonotal præscutum reddish yellow, subnitidous, with four blackened areas, two representing the cephalic third of the usual intermediate stripes, the other pair representing the lateral stripes, at outer ends outcurved to the lateral border; posterior sclerites of notum yellow, subnitidous; cephalic portion of each scutal lobe with a conspicuous black spot. Pleura yellow, the propleura and anepisternum more or less darkened. Halteres with stem yellow, knob weakly darkened. Legs with the coxæ and trochanters yellow; fore femora chiefly black, the bases narrowly yellow; middle femora more brownish black; posterior femora obscure yellow to brownish yellow; tibiæ brownish yellow to brown; tarsi black; claws (male) toothed. Wings with a brownish tinge, cell *Sc* and the stigma darker brown; prearcular field a little more yellowish; veins pale brown. Venation: *Rs* short, less than *m–cu*; R_{1+2} preserved; cell *1st* M_2 narrow; cell *2nd A* relatively wide.

Fig. 1.



Tipula smilodon, sp. n.

Details of male hypopygium. Symbols: *d*, dististyle; *s*, sternite; *t*, tergite.

Abdomen reddish yellow, the subterminal segments blackened, especially tergites seven to nine, and sternite seven and base of eight; remainder of hypopygium a little brightened. Male hypopygium (fig. 1) very large and conspicuous. Ninth tergite, *9t*, terminating in two blackened triangular lobes; from beneath ventral surface of tergite juts caudad a conspicuous depressed median structure, the margins at apex with about five strong recurved spines (apex figured). Dististyle, *d*, single, structure as figured. Eighth sternite, *8s*, very large and sheathing, produced into two powerful fang-like lobes that are directed caudad and dorsad, lying parallel to one another, their tips acute. Ovipositor with subfleshy valves.

Hab. Ecuador (Los Rios).

Holotype. ♂, Playas de Montalvo, altitude 15 metres, April 20, 1938 (*MacIntyre*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, several of both sexes, March 4 to April 20, 1938 (*MacIntyre*).

Tipula smilodon is very different from all other described species. The somewhat remarkable male hypopygium provides the chief specific characters. The specific name, *smilodon*, is suggested by a fancied resemblance of the spines of the eighth sternite to the fangs of the sabre-toothed cats, *Smilodon*.

Tipula tenuilobata, sp. n.

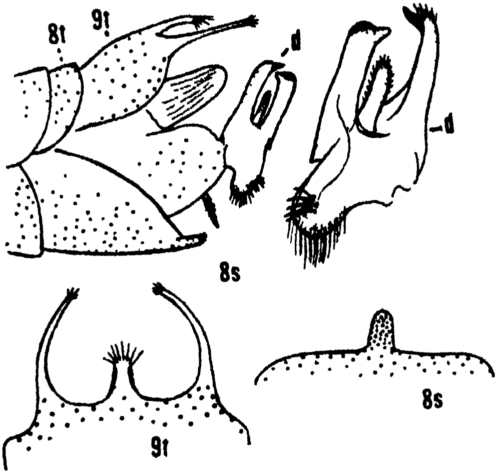
General coloration medium brown, the scutellum and postnotum more yellowish; præscutum without distinct stripes; antennæ (male) elongate, flagellar segments bicolorous; legs obscure yellow, the tarsi more infuscated; wings subhyaline, conspicuously patterned with brown, including the costal border and outer radial field; abdomen brownish yellow, the subterminal segments dark brown; male hypopygium with the tergite trilobed, the lateral lobes slender, much longer than the median; eighth sternite on caudal border with a small ligulate median lobe.

Male.—Length about 9 mm.; wing 10 mm.; antenna about 6 mm.

Frontal prolongation of head brown; palpi brownish black. Antennæ elongate, as shown by the measurements; basal four segments yellow; succeeding segments bicoloured, yellow, with the small basal enlargement narrowly dark brown; stem of outer segments more infuscated; flagellar segments moderately incised; terminal segment elongate-thimble-shaped. Head brown, the front and narrow orbits more greyish.

Mesonotal præscutum and scutum medium brown, without clearly defined stripes; scutellum and postnotum more yellowish; præscutal setæ small and sparse. Pleura pale yellow, especially ventrally. Halteres with stem yellow, knob brown. Legs with the coxæ and trochanters yellow; femora and tibiæ obscure yellow, tarsi passing into brown. Wings subhyaline, conspicuously patterned with brown, including the broad costal border and broad wing-tip in outer radial field; prearcular field darkened; costal darkening involving cephalic half of cell *R*; small darker brown spots at origin of *Rs*, anterior cord, posterior end of *m–cu*, *m*, and fork of M_{1+2}; veins yellow, darker in the infuscated areas. Venation: *Rs* arcuated, a little longer than *m–cu*; R_{1+2} entire; *r–m* greatly reduced, the basal section of R_{4+5} correspondingly lengthened; cell M_1 a little longer than its petiole; cell *2nd A* moderately wide.

Fig. 2.



Tipula tenuilobata, sp. n.

Details of male hypopygium. Symbols: *d*, dististyle; *s*, sternite; *t*, tergite.

Abdomen obscure brownish yellow, the basal segments clearer yellow, the subterminal segments dark brown. Male hypopygium (fig. 2) with the tergite separated from the sternite and basityle, the apex of latter obtuse. Ninth tergite, *9t*, extensive, the caudal border trilobed, the median lobe shorter and broader, tipped with long coarse setæ; lateral lobes long and slender, the extreme tips with a few shorter setæ. Dististyle, *d*, as figured, terminating in two blackened lobes, the more cephalic slender and bent at a right angle ; base of style produced ventrad into an obtuse, conspicuously hairy lobe. From notch of ninth sternite projects ventrad and slightly caudad a pair of straight pale spines that are densely covered with pale setæ. Eighth sternite moderately sheathing, bearing a small liguliform median lobe.

Hab. Ecuador (Oriente).

Holotype, ♂, Jatun Yacu, altitude 700 metres, March 1937 (*MacIntyre*).

The closest described relative is *Tipula inæquilobata* Alexander, likewise from the Oriente of Ecuador, which differs in the nature of the wing-pattern, and, especially, in the structure of the male hypopygium.

Tipula luctifica, sp. n.

Belongs to the *smithi* group ; general coloration reddish brown ; antennæ (male) very long, only a little shorter than the body, flagellum black ; wings greyish subhyaline, patterned with brown, including cells *C* and *Sc* ; R_{1+2} entire ; abdominal tergites one to five obscure yellow, narrowly blackened laterally, segments six to eight black ; hypopygium reddish brown ; male hypopygium with the dististyle consisting of two flattened black plates, the inner one produced caudad into a cylindrical yellow arm that is tipped with two unequal spines ; a pale yellow setiferous lobe juts from the notch of the ninth sternite ; ovipositor with fleshy cerci.

Male.—Length about 11–11·5 mm. ; wing 12–12·5 mm. ; antenna about 9–9·5 mm.

Female.—Length about 11–12·5 mm. ; wing 11·5–13·5 mm.

Frontal prolongation of head plumbeous black ; palpi dark brown. Antennæ (male) very long, as shown by the measurements ; scape and pedicel yellow, first flagellar segment obscure yellow on basal half, the apex brownish black ; remaining segments black, on the more proximal segments the extreme base brightened ; segments elongate, very feebly incised, the longest verticils less than one-half the segments. Head light grey ; anterior vertex a little more than twice the diameter of scape, without vertical tubercle.

Pronotum brown, sparsely pruinose. Mesonotal præscutum reddish brown, slightly more pruinose laterally, without distinct stripes; præscutal setæ very small; posterior sclerites of notum brownish grey, without distinct pattern. Pleura yellow, the dorsopleural membrane more dusky. Halteres brownish black. Legs with coxæ and trochanters yellow; femora obscure yellow; tibiæ brownish yellow, tarsi more blackened; claws (male) with conspicuous basal tooth. Wings greyish subhyaline, patterned with dark brown, including all of cells *C* and *Sc*, in cases the latter more yellowish brown; stigma oval, dark brown; conspicuous brown seams on both anterior and posterior cords, slightly interrupted or much narrowed at bases of cells *1st* M_2 and M_4; wing-tip in outer radial field darkened; outer medial veins seamed with brown; veins brown, darker in the patterned areas. Squama naked. Venation: *Rs* short, arcuated, subequal to *m–cu*; R_{1+2} entire; outer medial cells short; M_{3+4} short, only a little exceeding *r–m*; cell *2nd A* relatively wide.

Abdominal tergites one to five obscure yellow, narrowly blackened laterally, the caudal borders of segments very narrowly paler yellow; basal five sternites yellow, segments six to eight inclusive black; hypopygium chiefly reddish brown. Male hypopygium with the caudal margin of tergite very broadly notched, the lateral lobes narrowly obtuse, the entire caudal border set with abundant blackened spines. Dististyle consisting of two obtuse flattened black plates lying side by side, the inner one produced caudad into a cylindrical yellow arm that is tipped with two conspicuous unequal spines. From notch of ninth sternite juts a pale yellow lobe provided with very abundant dense pale setæ. Eighth sternite with caudal border truncate or very feebly emarginate, provided medially with pale membrane. Ovipositor with short fleshy cerci.

Hab. Ecuador.

Holotype, ♂, San Francisco, Rio Pastaza, altitude 1300 metres, October 1, 1938 (*MacIntyre*). *Allotype*, ♀, Mapoto, altitude 1300 metres, March 1939 (*MacIntyre*). *Paratypes*, 1 ♂, 1 ♀, with the allotype; 1 ♀, Lamass, near Baños, altitude 2500 metres, July 11, 1937; 1 ♀, Mount Tunguragua, altitude 3000 metres, May 12, 1937 (*MacIntyre*).

Tipula luctifica is distinguished from other allied members of the group by the unusually long antennæ, pattern of wings, and, especially, the structure of the male hypopygium.

Tipula consonata, sp. n.

Belongs to the *glaphyroptera* group; general coloration of mesonotum yellow, the præscutum with three entire brown stripes; antennæ (male) very short, bicoloured, the bases of the flagellar segments black, the remainder yellow; pronotum and scutellum yellow; knobs of halteres yellow; femora yellow, with a blackened ring immediately before tips; claws (male) simple; wings cream-yellow, heavily fasciate with brown; cell *C* uniformly dark; *Rs* long; male hypopygium with the caudal border of tergite with a very small, rounded notch.

Male.—Length about 12 mm.; wing 15 mm.; antenna about 2·6 mm.

Frontal prolongation of head obscure yellow; nasus distinct; palpi obscure yellow, the terminal segment brownish black. Antennæ short; basal three segments yellow, succeeding flagellar segments bicoloured, the basal enlargement black, the remainder yellow; flagellar segments very feebly incised; longest verticils subequal in length to the segments. Head buffy, the vertical tubercle narrowly darkened medially.

Pronotum yellow. Mesonotal præscutum yellow, with three entire brown stripes, the median one broad, especially in front; lateral stripes narrow, the mesal edge paling to brownish yellow; scutal lobes each with two brown areas; scutellum yellow, parascutella brown; mediotergite pale yellow, more darkened posteriorly; pleurotergite infuscated. Pleura buffy yellow, restrictedly variegated with brown areas. Halteres yellow, the outer portion of stem a little darker, apex of knob clearer yellow. Legs with the coxæ and trochanters yellow; femora yellow, with a blackened ring immediately before the slightly paler apex; tibiæ obscure yellow; tarsi passing into brownish black; claws (male) simple. Wings with the ground-colour cream-yellow, heavily patterned with brown; cell *C* uniformly brown, cell *Sc* yellow with four major brown areas, the first at arculus, the third at origin of *Rs*; dark areas more or less fasciate, beyond cord much more extensive than the ground, restricting the latter to a short poststigmal fascia and central spots in cell R_5 and the outer medial cells; a complete zigzag band at origin of *Rs*, crossing the wing, widened behind, ending in cell *1st A*; basal half of cell *Cu* darkened; prearcular field variegated with yellow and brown; veins yellow in the ground, darker in the clouded areas. Venation: *Rs* long, nearly three times *m–cu*; R_{1+2} atrophied; petiole of cell M_1 shorter than *m*.

Abdominal tergites yellow, beyond the second conspicuously darkened medially and less evidently laterally; outer segments more uniformly darkened; basal sternites yellow, the outer segments weakly darkened; hypopygium brownish yellow. Male hypopygium with the tergite produced into rounded lateral lobes, the central area of the margin truncate, with a very small rounded notch. Outer dististyle a small pale clavate structure. Inner dististyle relatively narrow, the beak setuliferous to apex. Gonapophyses terminating in slender acute spines. Eighth sternite unarmed, the caudal margin truncate.

Hab. Ecuador.

Holotype, ♂, Baños, altitude 2200 metres, October 15, 1938 (*MacIntyre*).

Tipula consonata is closest to *T. fraudulenta* Alexander, differing especially in the coloration of the body and wings and in the venation.

Tipula delectata, sp. n.

Belongs to the *glaphyroptera* group; mesonotal præscutum yellow, with three dark brown stripes, the broad median vitta slightly constricted opposite the pseudosutural foveæ, the central portion behind this point restrictedly pale; antennal flagellum bicoloured scutellum and mediotergite conspicuously darkened medially; knobs of halteres yellow; femora obscure yellow, passing into brown, the tips blackened, preceded by a clear yellow ring; wings with the cephalic two-thirds light yellow, the posterior portion subhyaline, the surface heavily patterned with brown; R_{1+2} entire; cerci elongate, straight.

Female.—Length about 21 mm.; wing 19·3 mm.; antenna about 3 mm.

Frontal prolongation of head relatively long, exceeding the remainder of head; obscure yellow, with a lateral brown line; nasus distinct; palpi brownish black. Antennæ moderately long, in female subequal to the palpi; basal three segments yellow, succeeding segments bicoloured, the bases dark brown, the more extensive apices clear light yellow. Head brown, with a very delicate, median, brown line, more distinct behind; vertical tubercle low.

Pronotum obscure yellow, with three brownish-black areas. Mesonotal præscutum yellow, with three dark brown stripes, the broad median vitta slightly constricted opposite the pseudosutural foveæ, behind this point with a central pale line; scutum pale, each lobe conspicuously variegated with dark brown, the median area slightly darkened; scutellum pale yellow with a conspicuous median brown line, parascutella dark brown; mediotergite yellow laterally, with about the central third dark brown, this area broadly expanded at posterior border. Pleura obscure yellow, variegated with brown, especially on the cephalic anepisternum and cephalic pteropleurite; ventral pleurotergite darker than the dorsal section. Halteres with stem brown, its base narrowly pale, knob conspicuously pale yellow. Legs with the coxæ obscure yellow, the fore pair more infuscated at base; trochanters yellow; femora obscure yellow basally, at or before mid-length passing into brown, the tip blackened, preceded by a subequal yellow ring; on some of the legs (detached, apparently the hind pair), the extreme femoral tips are again narrowly pale brown; tibiæ obscure brownish yellow, the tips narrowly brownish black; basal two tarsal segments obscure brownish yellow, the outer three segments black. Wings with cephalic two-thirds clear light yellow, the posterior and outer cells, including the anals, cubital, and outer medial fields, more subhyaline; a heavy brown pattern, more marbled and tesselated in the posterior subhyaline fields, heavier and more concentrated in the yellow costal portion: a major dark area at arculus, extending from costa to cubitus; smaller areas at origin of *Rs* and beyond mid-length of vein *R*, not reaching vein *M* behind; extensive areas at *r–m* and outer end of cell *1st* M_2; stigma and spots at outer ends of veins R_3 and R_{4+5} paler brown; axillary border narrowly darkened; veins yellow, darker in the clouded areas. **Venation**: R_{1+2}

entire; *Rs* long, a little less than twice *m–cu*; cell 1st M_2 relatively long, parallel-sided; *m–cu* suberect, joining M_4 beyond origin.

Abdominal segments brownish yellow, vaguely patterned with darker, including a very ill-defined broken median tergal stripe; outer segments more extensively darkened; cerci relatively long and slender, straight, sclerotized.

Hab. Ecuador.

Holotype, ♀, El Tablon, near Baños, altitude 2000 metres, October 28, 1938 (*MacIntyre*).

Tipula delectata is generally similar to *T. absona* Alexander and *T. browniana* Alexander, differing conspicuously in the pattern of the thorax, legs, and wings.

Tipula flavidula, sp. n.

Belongs to the *glaphyroptera* group; general coloration yellow, the præscutum with three subnitidous reddish stripes; lateral border of præscutum with a conspicuous black spot; antennæ short, the basal segments yellow, the outer segments passing into brown; legs yellow, the tips of the femora narrowly but abruptly blackened; wings yellow, with a very ill-defined brown pattern, including a series of three small subcostal darkenings; R_{1+2} atrophied; abdominal tergites yellow, trivittate with brown; male hypopygium small; eighth sternite unarmed.

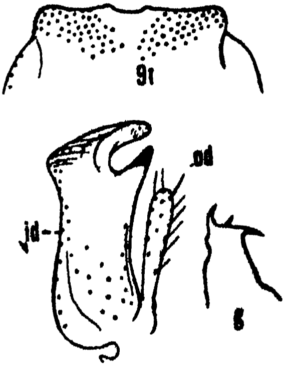
Male.—Length about 9–11 mm.; wing 12–14 mm.; antenna about 2·2–2·5 mm.

Female.—Length about 11–13 mm.; wing 12–14 mm.

Frontal prolongation of head yellow, nasus distinct; basal segment of palpus yellow, succeeding two segments brown, terminal one black. Antennæ short; basal four or five segments yellow, outer segments passing into brown; flagellar segments very feebly incised or with basal swelling scarcely evident; verticils shorter than the segments. Head dull yellow.

Pronotum brownish yellow. Mesonotal præscutum yellow, with three subnitidous reddish stripes; lateral border of præscutum behind the pseudosutural foveæ with a conspicuous black spot; scutum yellow, each lobe variegated with ferruginous; scutellum and postnotum yellow. Pleura yellow, in cases with a small brown spot on ventral anepisternum. Halteres pale yellow. Legs yellow, the tips of femora narrowly but abruptly blackened; tibiæ yellow, the tips even more narrowly dark brown; tarsi yellow, the outer segments infuscated. Wings yellow, the prearcular and costal fields more saturated yellow; stigma brown; a very restricted brown pattern, as follows:—Arculus; three small subcostal darkenings, the second at origin of *Rs*, the third at tip of *Sc*; very pale brown washes at cord, wing-apex, outer end of cell *M*, and even less distinctly in the anal cells; veins yellow, a little darker in the clouded portions. Venation: R_{1+2} atrophied; *Rs* long, about two and one-half times *m–cu*, the latter joining M_4 some distance beyond base.

Fig. 3.



Tipula flavidula, sp. n.

Details of male hypopygium. Symbols: *g*, gonapophysis; *id*, inner dististyle; *od*, outer dististyle; *t*, tergite.

Abdominal tergites yellow, trivittate with brown, the lateral stripes darker, especially on basal segments; median stripe more or less interrupted at posterior border of segment; sternites yellow; subterminal segments more extensively darkened; hypopygium yellow. Male hypopygium small. Caudal margin of ninth tergite (fig. 3, 9*t*) nearly transverse, with a very shallow median notch. Basistyle with a small pale setiferous lobe at base of dististyle. Dististyles, *d*, as figured. Gonapophyses, *g*, trispinous at tips. Eighth sternite unarmed. Ovipositor with elongate cerci.

Hab. Ecuador.

Holotype, ♂, Mt. Tunguragua, altitude 2600 metres, April 15, 1939 (*MacIntyre*). *Allotype*, ♀, Baños, altitude 1900 metres, May 11, 1937. *Paratypes*, several ♂♂♀♀, with allotype, altitude 1800–2000 metres, May 25 to June 6, 1936; Santa Rosa, near Baños, altitude 2500 metres, June 3, 1937; El Salado, near Baños, altitude 1900 metres, May 31, 1937; El Salto, near Baños, altitude 2000 metres, June 3, 1937; Pititi, near Baños, altitude 1900 metres, June 7, 1937 (*MacIntyre*).

Tipula flavidula is quite distinct from the other generally similar yellow regional species so far described. The chief distinctive characters lie in the body-coloration, short antennæ, pattern of legs and wings, loss of vein R_{1+2}, and the structure of the small simple male hypopygium.

Tipula coronaria, sp. n.

Belongs to the *glaphyroptera* group; general coloration yellow, with a dark brown longitudinal stripe on the dorsal thoracic pleurites; antennæ (male) relatively long; legs yellow, the femora with a very narrow and ill-defined pale brown ring; wings pale yellow, with a very sparse and vague brown pattern; *Rs* about one-third longer than *m–cu*; male hypopygium with the caudal margin of tergite convexly rounded, with a very small, rounded, median notch.

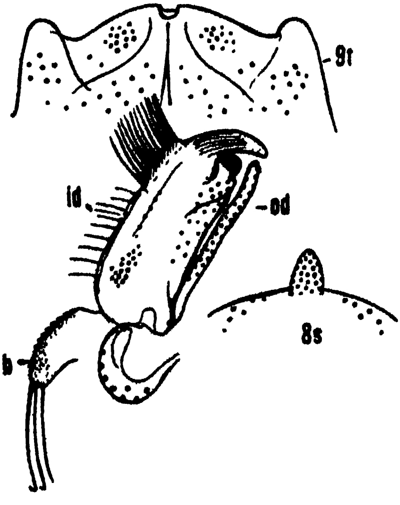
Male.—Length about 12 mm.; wing 15 mm.; antenna about 4·5 mm.

Female.—Length about 13–15 mm.; wing 14·5–15 mm.

Frontal prolongation of head long, pale yellow above, brown on sides; nasus elongate, pale yellow; palpi relatively short, basal three segments pale brown with paler incisures; terminal segment black. Antennæ (male) relatively long, as shown by the measurements; basal three segments yellow; outer segments almost uniformly dark brown; flagellar segments rather strongly incised; verticils shorter than the segments. Head yellow, sparsely white pruinose, postgenæ darker; vertical tubercle relatively low.

Pronotum yellow, with a narrow brown median vitta. Mesonotal præscutum yellow, opaque, with three scarcely differentiated darker yellow stripes, the median one further divided on posterior half by a capillary darker vitta; scutum pale yellow, the centres of lobes a trifle darker; scutellum and postnotum whitish, each with a capillary median darker brown vitta. Pleura opaque yellow, with a narrow dark brown longitudinal stripe extending from the cervical sclerites across the dorsal pleurites to the wing-root. Halteres pale yellow, relatively elongate. Legs with the coxæ and trochanters yellow; femora yellow, with a very narrow and ill-defined pale brown subterminal ring; remainder of legs yellow, only the terminal tarsal segments a little darkened; claws simple. Wings pale yellow, very sparsely and vaguely patterned with darker, including small but darker clouds at mid-length of vein *Sc*, origin of *Rs*, tip of Sc_2, and along cord and outer end of cell *1st* M_2; scarcely indicated dusky clouds in cubital and anal fields; veins yellow, a trifle darker in the clouded areas. Venation: *Rs* about one-third longer than *m–cu*; R_{1+2} entire; cell *2nd A* of moderate width.

Fig 4.



Tipula coronaria, sp. n.
Details of male hypopygium. Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.

Abdomen yellow, the tergites with a narrow median brown stripe that is slightly interrupted at the incisures;

eighth segment darkened. Male hypopygium relatively small. Ninth tergite (fig. 4, *9t*) with the caudal margin evenly convex, with a very small, rounded, median notch; lateral shoulders of tergite conspicuous. Basistyle with the mesal lobe subglobular; ventral lobe, *b*, more elongate, terminating in two or three very long, strong setæ that exceed the lobe in length, their tips curved. Outer dististyle, *od*, slender, pale. Inner dististyle, *id*, bearing a flattened crest on outer margin before apex, this fringed with more than a dozen strong setæ. Eighth sternite, *8s*, with the median lobe small, its length about twice the width; remainder of sternite with very few major setæ.

Hab. Ecuador.

Holotype, ♂, Rio Blanco, near Baños, altitude 1700 metres, October 12, 1938 (*MacIntyre*). *Allotopotype*, ♀, altitude 1600 metres, June 25, 1937. *Paratopotype*, ♀, altitude 1800 metres, October 31, 1938 (*MacIntyre*).

Tipula coronaria somewhat resembles *T. flavidula*, sp. n., but is entirely distinct, especially in the body coloration, pattern of the legs and wings, and in the structure of the male hypopygium.

Tipula runtunensis, sp. n.

Belongs to the *glaphyroptera* group; general coloration yellow, the præscutum with three slightly darker, pale brown stripes; antennæ moderately long, flagellum brownish black, the basal enlargements of the segments a very little darker; wings with a strong yellow tinge, cells *C* and *Sc*, together with the stigma, pale brown; restricted pale brown clouds at origin of *Rs* and along cord; abdomen yellow, the subterminal segments more infuscated; male hypopygium large, tergite produced medially into a flattened lobe that terminates in four points; outer dististyle irregular in conformation; eighth sternite with a simple median liguliform lobe.

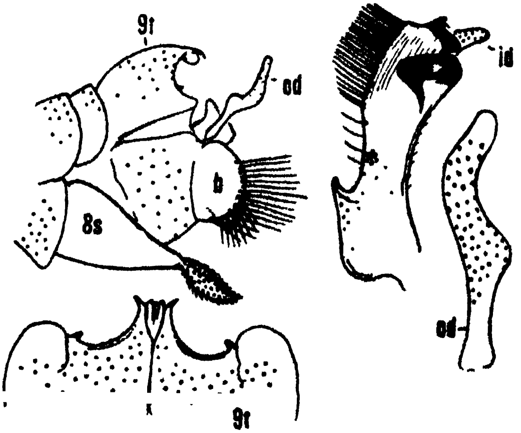
Male.—Length about 15 mm.; wing 17 mm.; antenna about 5 mm.

Female.—Length about 17–21 mm.; wing 17–21 mm.

Frontal prolongation of head obscure buffy yellow above, more brownish on sides; nasus very long and slender; palpi brownish black. Antennæ (male) relatively long, as shown by the measurements; scape yellow, pedicel and first flagellar segment very pale yellow; remainder of flagellum in male brown, the basal enlargements of segments more brownish black, in female, the flagellum more strongly bicoloured; flagellar segments (male) moderately incised; verticils long, subequal in length to the segments; terminal segment very small. Head buffy, with faint indications of a darker median vitta; vertical tubercle low.

Mesonotum yellow, the præscutum with three slightly darker, pale brown stripes that are ill-delimited against the ground; median stripe with a capillary median darkening at cephalic end; posterior sclerites of notum with a vague, paler brown, median vitta extending from suture to abdomen. Pleura yellow. Halteres with stem yellow, knob pale brown. Legs with coxæ and trochanters yellow; remainder of legs broken. Wings with a strong yellow tinge; cells *C* and *Sc* more infumed; stigma pale brown; pale brown clouds at origin of *Rs* and along cord; small but conspicuous white obliterative areas before stigma and in base of cell *1st* M_2; veins yellow. The allotype female has the wings clearer and brighter yellow. Venation: *Rs* about twice the length of *m–cu*; R_{1+2} preserved; cell *2nd A* relatively narrow.

Fig. 5.



Tipula runtumensis, sp. n.

Details of male hypopygium. Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.

Abdomen yellow, the basal tergites with a very indistinct brown median stripe; subterminal segments more infuscated. Male hypopygium (fig. 5) relatively large; tergite and basistyle separated from the sternite, the latter oval, protuberant, its outer portion provided with very long conspicuous yellow setæ, the ventral portion slightly produced. Ninth tergite, *9t*, with the median area produced caudad, terminating in four points, the lateral ones more acute and divergent; lateral shoulders of tergite relatively conspicuous, provided with abundant delicate setulæ; caudal margin of tergite, just mesad of the lateral lobes, with a small blackened tooth. Outer dististyle, *od*, pale, irregular in conformation, dilated at near mid-length, the distal portion a flattened blade with obtuse tip. Inner dististyle, *id*, with a conspicuous comb of long strong spinous setæ on outer margin of distal third or more. Eighth sternite, *8s*, with a simple median liguliform lobe; surface of sternite without setæ.

Hab. Ecuador.

Holotype, ♂, Runtun, near Baños, altitude 2200 metres, August 1938 (*MacIntyre*). *Allotopotype*, ♀, altitude 3000 metres, January 9, 1939. *Paratypes*, ♂, Mount Tungurагua, altitude 3000 metres, May 12, 1937; ♂, Rio Blanco, near Baños, altitude 1900 metres, June 1937; ♀, Abitagua, Oriente, altitude 1000 metres, November 12, 1936.

Tipula runtunensis is quite distinct from other regional species hitherto made known, although somewhat similar to *T. coronaria*, sp. n., and *T. flavidula*, sp. n., described herewith. The structure of the male hypopygium is distinctive.

Tipula (*Microtipula*) *tunguraguana*, sp. n.

General coloration brown, the humeral region and cephalic portion of the præscutum more yellowish; antennæ (male) very long, if bent backward extending about to mid-length of abdomen, the flagellum black; halteres elongate, pale brown; femora black, with a narrow subterminal yellow ring; wings cream-yellow, heavily patterned with brown; R_{1+2} entirely atrophied; *m–cu* at near mid-length of vein M_{3+4}; abdominal tergites brownish black, the basal sternites a little more yellowish.

Male.—Length about 8 mm.; wing 9·5 mm.; antenna about 5·5 mm.

Frontal prolongation of head dark brown; nasus distinct; palpi brownish black. Antennæ (male) of unusual length, if bent backward extending about to mid-length of abdomen; scape, pedicel, and base of first flagellar segment yellow, remainder of antennæ black; flagellar segments with small basal enlargements; verticils about one-half the length of the segments. Head brown, the front paler.

Pronotum brown. Mesonotal præscutum chiefly brown on sides and behind, the humeral region more yellowish, the cephalic portion of the intermediate stripes chiefly obscure yellow; a narrow median dark brown vitta; posterior sclerites of notum dark brown, the scutellum more yellowish brown. Pleura obscure yellow, variegated with dark brown, especially on propleura, anepisternum, dorsal sternopleurite, meron, and pleurotergite. Halteres elongate, pale brown. Legs with the coxæ and trochanters pale; femora brownish black, more yellowish basally, with a narrow yellow subterminal ring; tibiæ brownish black, the terminal tarsal segments paler. Wings with the ground-colour cream-yellow, even brighter yellow in the outer radial field, the disk very heavily patterned with brown, involving all cells of wing; cell *C* almost uniformly pale brown, cell *Sc* a little variegated with darker brown; a dark postarcular area; a Y-shaped dark area in cells *R* and *M*, before origin of *Rs* enclosing a small pale spot of the ground-colour at vein *R*, the band continued posteriorly across the more caudal cells, ending in cell *2nd A*; a narrow zigzag band of the ground-colour before cord; basal half of cell M_1 pale; veins brown, paler in the ground areas. Venation: R_{1+2} entirely atrophied; petiole of cell M_1 short, a little longer than *m*; *m–cu* close to mid-length of M_{3+4}.

Basal abdominal tergites brown, succeeding tergites brownish black; basal sternites a trifle more yellowish; hypopygium chiefly darkened.

Hab. Ecuador.

Holotype, ♂, Chaupi, Mt. Tunguragua, altitude 3000 metres, August 28, 1936 (*MacIntyre*).

Tipula (*Microtipula*) *tunguraguana* is quite distinct from all other described species of the subgenus, differing especially in the very long antennæ, coloration of the mesonotum, and the venation, as the position of *m–cu* far before the fork of M_{3+4}.

Tipula (*Microtipula*) *æquitorialis*, sp. n.

Size medium (wing, male, over 8 mm.); antennæ approximately one-half the length of body, flagellum black; flagellar segments moderately incised; thorax plumbeous grey, without markings; femora brownish yellow, the tips narrowly blackened; wings subhyaline, cells *C* and *Sc*, with the wing-tip in outer radial field, more strongly infumed; cell M_4 not conspicuously wider at base than at apex; male hypopygium with the outer dististyle short and stout.

Male.—Length about 7·5–8·5 mm.; wing 8–9 mm.; antenna about 3–4·5 mm.

Female.—Length about 9·5 mm.; wing 10 mm.

Frontal prolongation of head brownish black, paler on sides; palpi black. Antennæ with scape dark brown, pedicel obscure yellow, flagellum black; flagellar segments elongate, moderately incised, verticils short. Head light grey on front and orbits, the vertex pale brown; vertical tubercle very low.

Pronotum grey. Mesonotal præscutum with disk plumbeous grey, without distinct stripes, the lateral margins lighter grey; scutum and scutellum plumbeous grey; mediotergite lighter grey. Pleura pale, the anepisternum darker; surface of pleura sparsely pruinose. Halteres brownish black. Legs with the fore and middle coxæ pruinose, posterior pair more yellowish; trochanters yellow; femora brownish yellow, passing into black at tips; tibiæ dark brown, the tips blackened; tarsi black; claws (male) with a very small tooth before mid-length. Wings subhyaline, cells *C* and *Sc*, with the wing-tip in outer radial field, more strongly infumed; stigma oval, dark brown; cord narrowly seamed with brown, especially along the anterior cord; very pale brown washes along outer medial veins and in cephalic portion of cell *R* adjoining vein *R*; veins dark brown. Venation: R_{1+2} atrophied; petiole of cell M_1 about equal to cell; cell M_4 not markedly wider at base than at apex; *m–cu* a little less than one-half as long as distal section of Cu_1; cell *2nd A* a trifle wider than in *amazonica*.

Abdomen with the tergites black, the basal rings of the intermediate segments narrowly yellow; segment five more extensively yellow; tergites six and seven black, eight and nine reddish; basal sternites yellow, seven and the base of eight more blackened. Male hypopygium with the ninth tergite more shallowly notched than in *amazonica*, the lateral lobes broad, each weakly emarginate at apex. Outer dististyle somewhat shorter and stouter than in *amazonica*.

Hab. Ecuador (Oriente).

Holotype, ♂, Macas, Rio Upano, altitude 1050 metres, January 25, 1939 (*F. Martin Brown*). *Allotype*, ♀, Abitagua, altitude 1200 metres, September 21, 1937 (*MacIntyre*). *Paratypes*, ♂, Jatun Yacu, altitude 700 metres, March 21, 1937; 3 ♂♂, with the allotype, August 20, September 20–21, 1937 (*MacIntyre*).

Tipula (*Microtipula*) *æquitorialis* is very closely related to the subgenotype, *T.* (*M.*) *amazonica* Alexander, of eastern Brazil, and may prove to represent only a race of the latter. It differs especially in the slightly larger size, length and structure of the antennæ, less heavily patterned wings, and in slight details of venation and structure of the male hypopygium. The Jatun Yacu paratype has the antennæ much shorter than in the holotype, the shortest measurements given above.

Limonia (*Peripheroptera*) *trinigrina*, sp. n.

General coloration of mesonotal præscutum golden-yellow, with three black stripes, the anterior ends of which are extensively polished black; femora yellow, the tips rather narrowly dark brown; wings pale yellow, restrictedly patterned with brown, including a seam along cord; stigma chiefly brown; Sc_1 a little longer than *Rs*; abdomen dark brown, the posterior borders of segments broadly brownish yellow.

Male.—Length about 6–6·5 mm.; wing 8·3–9 mm.

Rostrum reddish brown; palpi black. Antennæ black throughout; flagellar segments oval. Head brown; anterior vertex relatively wide, exceeding twice the diameter of scape.

Pronotum reddish brown. Mesonotal præscutum reddish brown, concealed by golden-yellow pollen, the disk with three brown stripes whose anterior ends are extensively polished black, involving almost all of the lateral pair and about the cephalic half of the broader median vitta; interspaces and posterior half of median stripe more brownish pollinose; scutum with lobes opaque dark brown, the median area more yellow pollinose; scutellum pale, sparsely pollinose; mediotergite with central portion darkened, the sides more reddish. Pleura reddish brown, pollinose, the anepisternum a little darker. Halteres with stem obscure yellow, knob dark brown. Legs with coxæ reddish yellow, the fore pair a trifle more darkened; trochanters obscure yellow; femora yellow, the tips rather narrowly dark brown; tibiæ yellow, the tips narrowly and indistinctly darkened; tarsi pale brown, the outer segments a little darker. Wings with a pale yellow tinge; a restricted brown pattern, including a band along cord; stigma chiefly dark brown, of moderate size only; narrower brown seams at arculus, Sc_2, and outer end of cell *1st* M_2; wing-tip rather narrowly and weakly infumed; veins yellowish brown to pale brown, darker in the patterned areas. Venation: Sc_1 ending opposite origin of Rs, Sc_2 some distance from tip, Sc_1 alone a little exceeding Rs; free tip of Sc_2 about its own length before R_2; inner ends of cells R_3 and R_5 in transverse alignment; cell *2nd* A narrow, scarcely wider outwardly than at the internal cross-vein.

Abdomen dark brown, the posterior borders of segments broadly obscure brownish yellow; hypopygium, especially the ventral dististyle, dark brown.

Hab. Ecuador.

Holotype, ♂, Baños, altitude 1900 metres, August 7, 1936 (*MacIntyre*). *Paratopotype*, ♂, altitude 2000 metres, August 5, 1936.

Limonia (*Peripheroptera*) *trinigrina* is closest to *L.* (*P.*) *angustifasciata* Alexander, of Venezuela, and *L.* (*P.*) *subandina* (Alexander), of Argentina, differing in the conspicuous pattern of the præscutum and in the coloration of the legs.

Limonia (*Peripheroptera*) *nearcuata*, sp. n.

General coloration yellow; antennal scape a trifle brightened; head grey, variegated with brown on anterior vertex; præscutum with a polished median stripe that encloses a restricted black linear mark; knob of halteres brownish black; femora obscure yellow, the tips abruptly brownish black; wings yellow, the wing-tip weakly infumed; very narrow brown seams at cord and outer end of cell *1st* M_2; cerci brownish black, very small and slender.

Female.—Length about 7 mm.; wing 8·3 mm.

Rostrum obscure yellow; palpi brownish black. Antennæ black, the scape a little more piceous or reddish brown; flagellar segments oval, the outer ones long-oval. Head grey, the anterior vertex with a dark brown spot, the posterior vertex with a somewhat more extensive paler brown area.

Thorax almost uniformly yellow, the surface pruinose, excepting a broad polished stripe on anterior half, this reddish yellow, enclosing a narrow polished black linear mark; median area of scutum, scutellum, and cephalic portion of mediotergite more heavily yellow pollinose. Pleura yellow pollinose. Halteres with stem yellow, brighter at base, the knob brownish black. Legs with the coxæ and trochanters yellow; femora obscure yellow, the tips abruptly brownish black, involving about the distal eighth or ninth of the segment; tibiæ dark brown, the tips a little darker; tarsi black. Wings with the ground-colour yellow, the wing-tip from level of distal end of cell *1st* M_2 outward weakly infumed; basal fourth of costal region more saturated yellow; stigma brown, oval, darker brown at the free tip of Sc_2 and R_2; cord and outer end of cell *1st* M_2 very narrowly seamed with brown; veins pale brown. Venation: Sc_1 ending a short distance before origin of *Rs*, Sc_1 about one-half as long as vein *Sc* between arculus and Sc_2; free tip of Sc_2 before level of R_2; inner end of cell R_3 moderately arcuated, of cell *1st* M_2 less evidently so; *m–cu* at fork of *M*; cell *2nd A* slightly widened on distal half, a trifle wider than the cell opposite the interanal cross-vein.

Abdomen obscure yellow, the genital segment infuscated. Cerci very small and slender, brownish black.

Hab. Ecuador (Oriente).

Holotype, ♀, Mapoto, altitude 1300 metres, March 1939 (*MacIntyre*).

Limonia (*Peripheroptera*) *nearcuata* is very close to *L.* (*P.*) *arcuata* (Alexander), of Peru. It differs in the larger size, pattern of the femora and wings, in the venational details, and in the very small, slender, brownish-black cerci.

Limonia (*Peripheroptera*) *perdelecta*, sp. n.

General coloration polished yellow; thorax unmarked; antennæ black throughout; femora yellow, the tips abruptly blackened, tarsi black, wings subhyaline, the very broad costal border yellow, more narrowly margined behind by brown; wings with long basal petiole; anal field greatly reduced, especially cell *2nd A*, which appears as a microscopic linear strip; abdominal segments yellow, with blackened bases, the outer segments more uniformly blackened.

Female.—Length about 5 mm.; wing 5·8 mm.

Rostrum reddish brown; palpi black. Antennæ black throughout; flagellar segments oval. Head polished brownish yellow, somewhat darker in front.

Thorax uniformly polished yellow, unmarked. Halteres with stem obscure yellow, knob brownish black. Legs with the coxæ and trochanters yellow; femora yellow, the tips abruptly blackened, involving about the outer seventh or eighth; tibiæ obscure yellow, a little darkened at base, the tips blackened; tarsi black. Wings subhyaline, the very broad costal border yellow, more narrowly margined behind by brown, including the interanal cross-vein in the prearcular field, postarcular in base of cell *M*. beyond mid-length of cell *R*, along cord and at wing-tip in outer ends of cells R_3 and R_5; darker brown spots in cell *Sc* above arculus, at Sc_2, free tip of Sc_2 and R_2; veins brownish yellow, somewhat darker in the infuscated portions. Wings with long basal petiole, greatly restricting the anal field. Venation: *h* very oblique; *Rs* unusually short, less than the arcuated basal section of R_{4+5}; Sc_1 ending opposite origin of *Rs*, Sc_2 at near mid-distance between arculus and origin of *Rs*; free tip of Sc_2 erect, far before R_2, which is gradually curved into R_1; cell *1st* M_2 about as long as vein M_{1+2} beyond it; *m–cu* just beyond fork of *M*; cell *2nd A* virtually lacking, reduced to a microscopic linear strip; cell *1st A* long and relatively narrow.

Abdomen annulated with yellow and black, the segments black basally, the apices broadly yellow; outer segments more uniformly blackened.

Hab. Ecuador.

Holotype, ♂, Balzapamba, altitude 700 metres, June 4, 1938 (*MacIntyre*).

Limonia (*Peripheroptera*) *perdelecta* is an unusually distinct species, readily told from all other described members of the subgenus by the pattern of the wings and by the unusually reduced cell *2nd A*.

Austrolimnophila tunguraguensis, sp. n.

Size large (wing, female, 14 mm.); general coloration of præscutum yellow, with three conspicuous dark brown stripes; scutellum yellow; pleura obscure yellow, striped longitudinally with dark brown; halteres elongate, knobs brown; femora and tibiæ brownish yellow, the former with a narrow dark ring before tip; wings yellow, heavily spotted and dotted with brown; *Sc* long, both Sc_1 and Sc_2 ending beyond fork of R_{2+3+4}; cell *1st* M_2 relatively short, with *m–cu* beyond mid-length; cell M_1 long, exceeding three times its petiole; abdominal tergites brown, sternites paler brown, the caudal borders of the segments narrowly yellow.

Female.—Length about 12 mm.; wing 14 mm.

Rostrum brown; palpi brownish black. Antennæ with scape and pedicel dark brown, especially the former; flagellum weakly bicoloured, pale brown, the apices of the segments restrictedly paler; flagellar segments elongate. Head light brown.

Pronotum obscure yellow, variegated with brown. Mesonotal præscutum yellow, with three conspicuous dark brown stripes, the humeral region and lateral border similarly infuscated, restricting the ground-colour to the well-delimited posterior interspaces; scutum obscure yellow, each lobe with a conspicuous dark brown area; scutellum yellow, the parascutella more darkened; mediotergite yellow on cephalic portion, the posterior half and sides more infuscated; pleurotergite darkened. Pleura obscure yellow, variegated with two dark brown longitudinal stripes, the more dorsal extending from the cervical region across the anepisternum and dorsal pteropleurite; lower stripe occupying the ventral sternopleurite and meron. Halteres elongate, stem yellow, knob dark brown. Legs with the coxæ brownish yellow, the fore pair darker; trochanters yellow; femora brownish yellow, narrowly darkened immediately before tips; tibiæ and tarsi obscure yellow, the terminal tarsal segments darker. Wings with the ground-colour pale yellow, with a heavy brown spotted and dotted pattern; major dark areas at arculus, origin of *Rs*, cord, outer end of cell 1*st* M_2, R_2, and fork of M_{1+2}; numerous smaller brown dots in other cells of wing, sparsest in cell *Sc* and in the costal interspaces beyond cord, tending to be arranged in a single row down centre of cell; veins brown, yellow in the costal interspaces. Venation: *Sc* long, both Sc_1 and Sc_2 ending beyond fork of R_{2+3+4}; *Rs* long, angulated at origin; cell 1*st* M_2 relatively short, with *m–cu* beyond mid-length; cell M_1 deep, exceeding three times its petiole.

Abdominal tergites brown; sternites paler brown, the caudal borders of the segments narrowly yellow.

Hab. Ecuador.

Holotype, ♀, Mt. Tunguragua, altitude 2600 metres, April 5, 1939 (*MacIntyre*).

Most similar to *Austrolimnophila merklei* Alexander, of southern Chile and Argentina, differing especially in the venation and pattern of the wings, notably the short cell 1*st* M_2 and much deeper cell M_1, with the petiole of the latter correspondingly shortened.

Epiphragma (*Epiphragma*) *filiformis*, sp. n.

General coloration dark brown, variegated with paler; antennæ (male) unusually long, without a basal fusion of flagellar segments; scape and pedicel black, first flagellar segment yellow, remainder black, cylindrical, with a conspicuous pale pubescence; halteres elongate, obscure yellow, the base of knob a little darker; femora yellow, with two blackened rings; tips of tibiæ and all tarsi yellow; wings brownish yellow, patterned with brown, including spots in cells *Cu* and 2*nd* *A*; male hypopygium with tergal lobes unusually broad and sclerotized, separated by a U-shaped notch; interbase with apex narrowed and strongly decurved into a crook; ædeagus narrowed at apex.

Male.—Length about 10 mm.; wing 11·5 mm.; antenna 4·2 mm.

Rostrum and palpi black. Antennæ unusually long for a member of this genus; scape and pedicel black; first flagellar segment light yellow, only a little thicker than the second, and not a fusion product; succeeding segments black, cylindrical, with a delicate white pubescence and verticils that are shorter than the segments. Head dark.

Mesonotal præscutum chiefly dark brown, the pattern difficult to determine in the unique type, due to the twisted body; posterior sclerites of notum paler, sparsely pruinose. Pleura extensively brownish black to black. Halteres elongate, obscure yellow, the base of knob a little darker. Legs with coxæ yellow, narrowly blackened basally; trochanters yellow; femora yellow, with two blackened rings, one postmedial the second subterminal, subequal in extent to the yellow ring enclosed; yellow apex narrower; tibiæ brownish black, paling to obscure yellow at tips, on one pair of legs (detached, probably the posterior pair) uniformly yellow; tarsi yellow. Wings with the ground-colour brownish yellow, heavily patterned with brown, including complete or partial ocelli at arculus, origin of *Rs*, and anterior cord; dark costal areas small and solid; a series of more or less confluent spots in cell *Cu*; about nine transverse dashes in cell *2nd A*; veins obscure yellow, darker in the clouded portions. Venation: Sc_2 longer than Sc_1; *m–cu* shortly beyond mid-length of cell *1st* M_2.

Basal abdominal tergites brownish black, the outer segments more blackened basally, slightly paler on outer portions to produce a weak dimidiate effect; hypopygium dark. Male hypopygium with ninth tergite having unusually broad and sclerotized lobes, separated by a deep U-shaped notch. Inner dististyle short. Interbase with apex narrowed and strongly decurved, crook-like. Ædeagus narrowed at apex.

Hab. Ecuador (Oriente).

Holotype, ♂, San Francisco, Rio Pastaza, altitude 1300 metres, October 1, 1938 (*MacIntyre*).

From the other neotropical species having the male antennæ more elongate than usual, including *Epiphragma* (*Epiphragma*) *annulicornis* Alexander (Argentina), *E.* (*E.*) *circinata* Osten-Sacken (Panama–Costa Rica), *E.* (*E.*) *gracilicornis* Alexander (Colombia), and *E.* (*E.*) *xanthomela* Alexander (Ecuador), the present fly differs especially in the pattern of the wings and structure of the male hypopygium. Of the above only *annulicornis* and *xanthomela* have a series of brown spots in cell *2nd A*; in the former the pattern is unusually ocelliform, even the outer costal spots being so formed; the antennæ are annulated yellow and black, while the femora has a single darkened ring; in *xanthomela* the wings and legs are differently patterned.

Shannonomyia sparsipunctata, sp. n.

General coloration grey, the præscutum with three distinct brown stripes; halteres pale throughout; legs obscure yellow, the terminal tarsal segments black; wings yellowish grey, sparsely patterned with brown; cell M_2 open by the atrophy of m; abdominal tergites brownish black, sternites brownish yellow to pale brown.

Female.—Length about 6·5 mm.; wing 6 mm.

Rostrum and palpi black. Antennæ small, black throughout; flagellar verticils elongate. Head light grey; anterior vertex broad.

Pronotum grey. Mesonotal præscutum grey, with three dark brown stripes, the median one entire; posterior sclerites of notum dark brownish grey. Pleura dark grey, the meral region yellowish. Halteres pale throughout. Legs with the fore coxæ brownish grey, remaining coxæ yellow; trochanters yellow; remainder of legs obscure yellow, the terminal tarsal segments black. Wings with the ground-colour of centre of disk yellowish grey, the distal fifth and basal half a little darker; prearcular field and costal region clearer yellow; a restricted dark pattern, including the oval, darker brown stigma and paler brown clouds at origin of Rs, cord and fork of M_{3+4}; veins pale, darker in the clouded areas. Venation: Sc relatively long, Sc_1 ending shortly before fork of Rs, Sc_2 near its tip; Rs relatively long, exceeding twice R_3, angulated at origin; R_2 before fork of R_{3+4}, subequal to R_{1+2}; R_{2+3+4} and R_3 subequal; cell M_2 open by atrophy of m; m–cu nearly half its own length beyond fork of M.

Abdominal tergites brownish black; sternites brownish yellow to pale brown; genital shield reddish brown; valves of ovipositor long and slender.

Hab. Ecuador (Oriente).

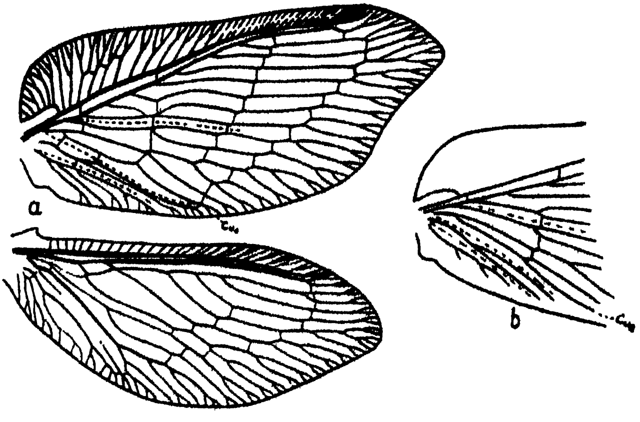
Holotype, ♀, San Francisco, Rio Pastaza, altitude 1300 metres, October 1, 1938 (*MacIntyre*).

Shannonomyia sparsipunctata differs from the other species of the genus having cell M_2 open (*S. ænigmatica* Alexander, *S. myersiana* Alexander, *S. orophila* Alexander, and *S. triangularis* Alexander) in the conspicuously patterned wings.

XVIII.—*New Genera and Species of* Hemerobiidæ (*Neuroptera*). By D. E. Kimmins, Department of Entomology, British Museum (Natural History).

The specimens from which these descriptions have been drawn up are in the British Museum collection. They are all from either the McLachlan or the Tillyard collections.

Fig. 1.



a, wings of *Drepanacrella khasiana*, sp. n., ♂; *b*, base of fore wing of *Drepanacra binocula* (Newm.), diagrammatic.

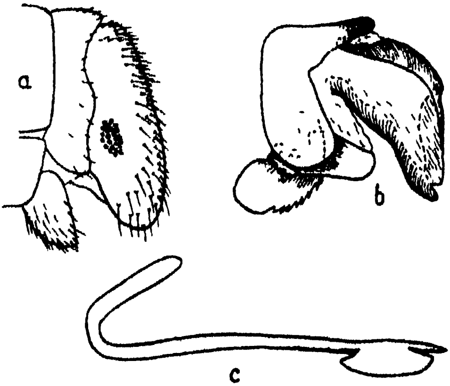
Drepanacrella, gen. nov. (Figs. 1 & 2.)

Characters almost as in *Drepanacra* Till. In the fore wing the basal cross-vein between Cu_1 and Cu_2 meets Cu_1 at its first branching. In *Drepanacra* Cu_2 is either forked at this level or else the cross-vein falls beyond the first branch of Cu_1, giving the appearance of a fork to Cu_2. In the male there are *two* pairs of vertical plates (of uncertain homology) associated with the tenth sternite. In *Drepanacra* these plates are represented by *one* pair of short curved rods. The parameres are also of a different form.

Genotype : *D. khasiana*, sp. n.

This insect is obviously very closely related to *Drepanacra* both in its structure and general appearance, and had it been taken in the Australian region I should have had little hesitation in placing it in that genus. A discontinuous distribution such as New Zealand, Tasmania, Australia, and Khasi Hills, Assam, for a compact genus such as *Drepanacra* seems incredible, and I have therefore decided to erect a new genus. The venational character given, although small, appears constant throughout a long series of *Drepanacra*. *Drepanacra plaga* Banks from Formosa (published whilst this paper was in the press) probably belongs to this new genus.

Fig. 2.



Drepanacrella khasiana, sp. n., ♂.
a, apex of abdomen ; *b*, tenth sternite, lateral ;
c, parameres, lateral.

Drepanacrella khasiana, sp. n.

♂.—Head tawny, face shining, genæ brownish, vertex dull, this matt area projecting in a short V between the bases of antennæ. Antennæ pale. Pronotum transverse, nearly twice as broad as long, matt brownish yellow; meso- and metanota similarly coloured. Legs pale tawny, apices of anterior femora and anterior and median tibiæ vaguely marked with brownish. Anterior wing hyaline, venation pale, apex falcate, membrane irrorated with pale brownish and variably marked with dark brown. In the typical form these markings consist of a streak along the inner gradate series, with a hyaline area adjoining basad; spots on some of the outer gradate series, on the fork of Cu_1, and a cross-vein about mid-length of the subcostal area; a streak along the posterior margin, becoming very pronounced in the basal angle; some transverse bands in costal area. In a variation there is a large dark spot adjoining and basad of the inner gradate series and some irregular dark streaks anterior to it. Six branches to *Rs*, first and second generally confluent soon after their origin and subsequently diverging. Nine veins in inner, thirteen in outer gradate series. Posterior wing subacute, scarcely falcate, hyaline, venation pale, membrane clouded with brownish at base of stigma, some outer gradate veins, apical third of median and fork of cubitus, from there extending basally along anal margin. Five branches to *Rs*, ten gradates in outer, four in inner series.

Abdomen paler than the rest of body; anal plates elongate but not conspicuous, being directed downwards across the apex of abdomen, apices rounded. Tenth sternite with a narrow dorsal arch projecting tailward, the side-lobes bent downwards at right angles. To the dorsal arch is hinged the ædeagus, consisting of two chitinous plates linked by membrane. The upper plate is bent downwards at about mid-length, the basal part convex, apical concave, its apical margin excised. Lower plate slightly bent, tapering to a rounded apex. Between the side-lobes are two pairs of small plates, set on edge, and with serrate lower margins. The outer, posterior pair appear to be fused at their apices. I am uncertain of the homology of these plates. Parameres long, slender, fused except at their apices into a rod, which is sharply angled basally. Apically they are acute, with an expansion resembling the blade of a halberd.

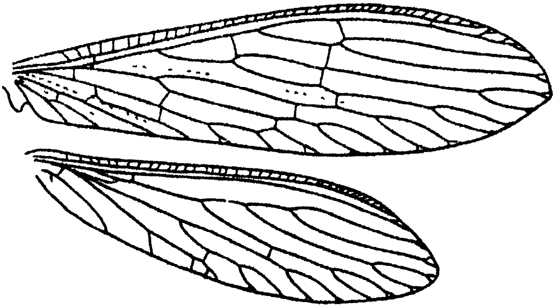
Length of anterior wing 8 mm., posterior wing 6·3 mm.

Assam, Khasi Hills. Type ♂, 2 ♂♂, 4 ♀♀ paratypes from the McLachlan collection.

Zachobiella angusta, sp. n. (Fig. 3.)

♀.—Body-colour shining brownish, palpi and legs paler. Antennæ about half as long as anterior wing. Pronotum produced and a little constricted anteriorly, slightly longer than broad. Abdominal tergites shining brown, sternites paler. Wings very narrow and acute, anterior three-and-a-half times as long as wide, hyaline, with pale venation. A pale brownish streak at base of subcostal area and a faint clouding over anal area. Posterior hyaline, without markings and with pale veins.

Fig. 3.



Zachobiella angusta, sp. n., ♀. Wings.

Length of anterior wing 4·6 mm., posterior wing 3·5 mm.

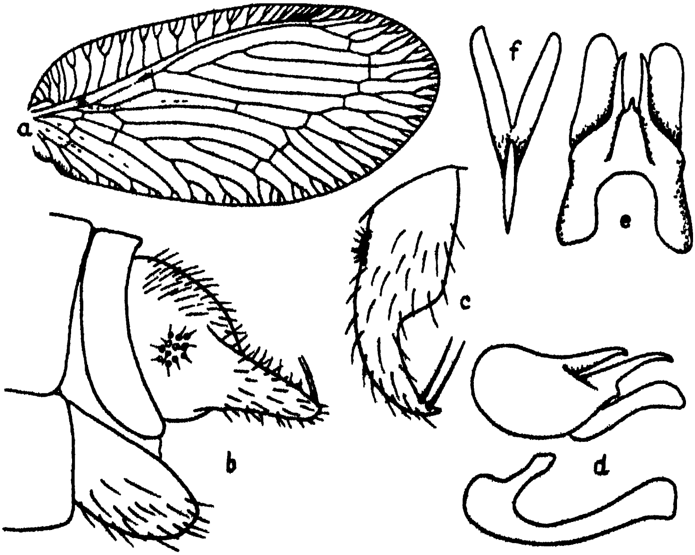
Type ♀, N. Queensland, Tully, 12. vi. 31 (*L. Franzen*), from the Tillyard collection.

This species is readily distinguished from *Z. submarginata* by its colour, smaller size and narrower wings, and the absence of markings on the cross-veins. It is closely allied to *Z. pallida* Banks.

Carobius trifurcatus, sp. n. (Fig. 4.)

♂.—Colour tawny, with brownish markings. Eyes large, globose. Mouth projecting very little below level of lower margin of eyes, vertex somewhat inflated. A brown spot on the gena. Antennæ pale. Pronotum pale brownish with yellowish lateral angles. Meso- and metanota brownish, scutellum of each yellowish white. Legs pale, without markings. Anterior wing about twice as long as broad, hyaline, with very faint indications of a number of transverse brownish bands. The presence of these bands is chiefly indicated by the brownish tint of the venation, which, in between the bands, is pale. As is frequently the case, this transverse banding is more noticeable to the unassisted eye than when examined with a lens. Cross-vein between R and its basal branch almost as far out as origin of second branch. The latter branch forks three times before the stigma. A single cross-vein in the disc of the wing between R_5 and M_{1+2}. Nine cross-veins in outer gradate series. Venation of hind wing as in other species of genus. Hyaline, veins mostly pale except in apical portion of wing.

Fig. 4.



Carobius trifurcata, sp. n., ♂.

a, anterior wing ; *b*, apex of abdomen, lateral ; *c*, left anal plate, dorsal ; *d*, tenth sternite and parameres, lateral ; *e*, tenth sternite, dorsal ; *f*, parameres, dorsal.

Abdomen pale tawny. Anal plates broad at base, then produced and tapering, incurved to an acute apex, which carries two stout bristles. Tenth sternite bearing five processes, three rigid and two hinged to it. The fixed processes consist of an upper median one, from the side slender, its apex downcurved. From above it is broad and tapering, suddenly constricted near its apex. On each side of it and at a lower level is seen another slender process, its apex also downcurved. The lowest pair of processes are spatulate from above, apices slightly downcurved from the side and are hinged to the lower margin of the tenth sternite. Parameres fused basally, apices divergent, truncate from the side. In this aspect the fused basal part is seen to be produced upward in a slender lobe.

Length of anterior wing 5·7 mm., posterior wing 4·8 mm.

Queensland, National Park, 3000 ft., 5. iii. 21 (*R. J. Tillyard*), 1 ♂.

This species differs from those previously described in the presence of three forks to the second branch of *Rs*. The form of the head (described above) appears to be a generic character, but I do not think it has been mentioned before.

Notiobiella callangana, sp. n. (Fig. 5.)

♂.—Head fulvous, genæ brownish, antennæ fulvous (incomplete). Pronotum fulvous, lateral angles yellowish, not very produced anteriorly, a little broader than long. Meso- and metanota dark fulvous. Legs pale fulvous, without markings. Anterior wing about two and a quarter times as long as broad, membrane slightly smoky hyaline, venation mainly pale except bases of costal cross-veins, most of the other cross-veins, and many forks, which are brownish. Stigma noticeable, creamy white tinged with red, about half as wide as costal area. Posterior wing also with a distinct stigma.

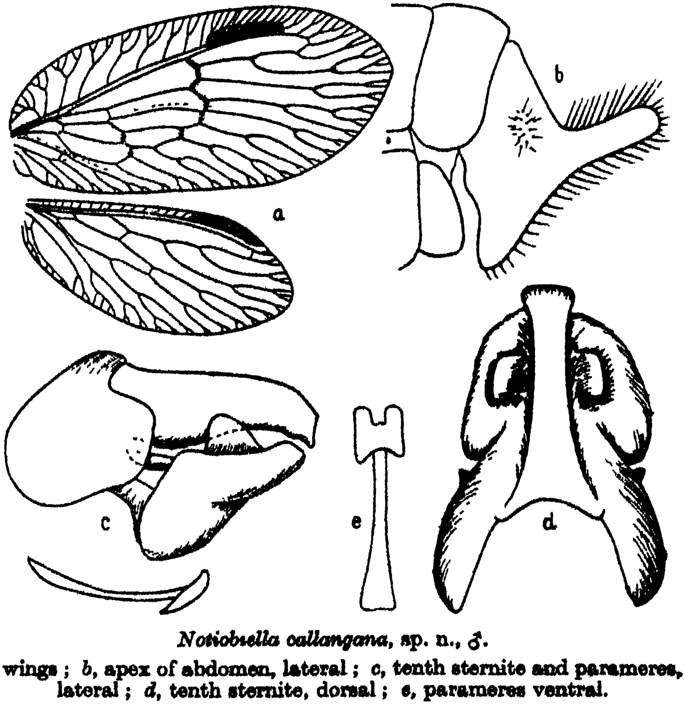
Abdomen fulvous, anal plates large, rhomboidal, the distal angle produced upward in a stout finger, about as long as the width of the plate. Tenth sternite of a pattern similar to other species of the genus, basal portion arched, with rounded side-lobes. From the upper part of the arch there arises a long tubular structure, directed tailward, whose apex is dilated and truncate. Beneath this is a large membranous sac, its surface closely set with microscopic setæ, and bearing on its upper side a pair of processes, quadrate from above, subtriangular from the side. Parameres small, fused, having a long slender stem and a dilated head, the apical margin of which is excised. Ninth sternite short and broad.

Length of anterior wing 6 mm., posterior wing 4·75 mm.

Peru, Callanga, from the McLachlan collection, 1 ♂.

This species may be distinguished from *N. rubrostigma* Navás (Paraguay) by the form of the anal plates. In the latter species they are said to be cylindrical, long, and obtuse, and no mention is made of the rhomboidal basal portion.

Fig. 5.



Notiobiella callangana, sp. n., ♂.

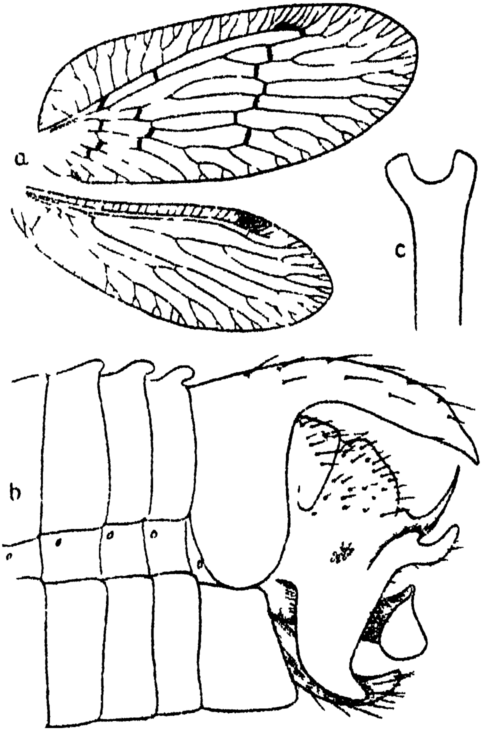
a, wings; *b*, apex of abdomen, lateral; *c*, tenth sternite and parameres, lateral; *d*, tenth sternite, dorsal; *e*, parameres ventral.

Annandalia tillyardi, sp. n. (Figs. 6 & 7.)

♂.—Body-colour pale fuscous. Clypeus piceous, genæ dark fuscous, vertex marked with a pale cross. Palpi dark fuscous, antennæ pale, darker at the tip. Pronotum transverse, with dark fuscous markings, lateral margins yellowish; meso- and metanota with dark markings.

Legs pale, anterior and median tibiæ with narrow darker rings, one near the base and the other about midway. Anterior wings narrow, about two-and-a-half times as long as wide, hyaline, much irrorated with brownish. Venation pale, cross-veins dark brown, and a number of brownish spots along the posterior margin. Six veins in the gradate series. Posterior wing hyaline, venation pale except near apex of wing.

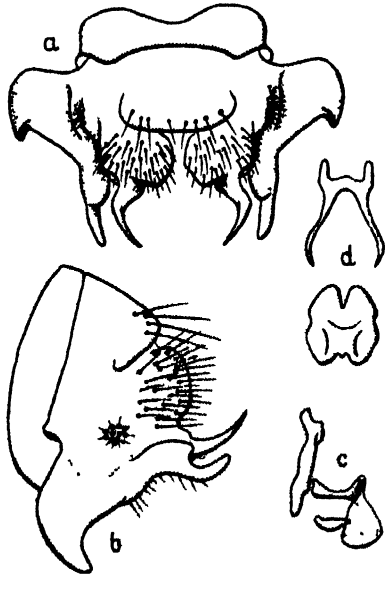
Fig. 6.



Annandalia tillyardi, sp. n., ♂.
a, wings; *b*, apex of abdomen, lateral; *c*, apex of process of eighth tergite.

Abdomen brownish. Tergites five to seven each with a small quadrate tooth at the centre of the apical margin, its apex sometimes excised. Eighth tergite with its apical margin enormously produced in a long horn, extending as far as the apex of the abdomen, slightly downcurved, apex dilated and with a semicircular excision. Ninth tergite narrow, withdrawn within the eighth, its lower angles produced backward. Tenth tergite consisting of a lightly chitinized, transverse dorsal plate and a pair of complex anal plates. Each anal plate bears

Fig. 7.



Annandalia tillyardi, sp. n., ♂.
a, ninth and tenth tergites, dorsal; *b*, the same, lateral; *c*, tenth sternite and parameres, lateral; *d*, the same, from behind.

two backwardly and upwardly directed processes, the inner slender and acute, the outer blunt and with a hump on its upper surface near its base. The lower margin of the anal plate produced downward in a subtriangular thin plate, curving outwards and tailwards. Tenth sternite reduced, from behind caliper-like, with a pair of horns arising from its upper surface. Parameres fused into a hood-like structure, which, seen from behind, is excised above and below. Ninth sternite produced, finger-like.

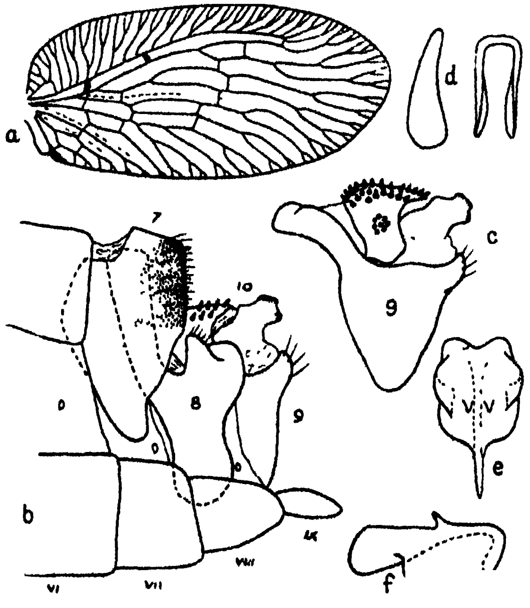
Length of anterior wing 6 mm., posterior wing 5 mm.

Type ♂, Queensland, Brisbane, 16. xi. 29, paratype ♂, same locality, 26. ix. 31; paratype ♀, Queensland, Toowoomba, 1. iv. 16, all from the Tillyard collection; paratype ♀, New South Wales, Sydney, 4. x. 84, from the McLachlan collection.

Annandalia franzeni, sp. n. (Fig. 8.)

♂.—Body-colour tawny. Genæ, two spots between the antennæ, and two divergent streaks on vertex brown. Terminal segment of maxillary and labial palpi brown. Antennæ not darker at tip. Pronotum with two broad longitudinal bands of brown, enclosing a tawny band of equal width and with lateral margins tawny. Meso- and metanota mainly brownish, with some paler markings.

Fig. 8.



Annandalia franzeni, sp. n., ♂.

a, anterior wing; *b*, apex of abdomen, lateral; *c*, ninth tergite and anal plate, lateral; *d*, tenth sternite, lateral and from behind; *e*, parameres, dorsal; *f*, the same, lateral.

Legs pale tawny, tibiæ with a narrow brown ring about midway. Anterior wing about twice as long as broad, greyish hyaline with vague brownish clouds (not irrorated), particularly around the cross-veins and apical furcations. Two basal cross-veins in the subcostal area dark brown. Costal area rather broad and more densely veined than in *tillyardi*. Venation mainly pale. Posterior wing hyaline, with pale veins, venation much as in *tillyardi*.

Abdomen with no produced teeth on the tergites; seventh tergite somewhat specialized, its apical margin darkly pigmented and armed with bristles. Eighth tergite with its dorsal part narrow, retracted within the seventh, its lateral margins reniformly dilated, the upper angle of the dilatation carrying a triangular process. Ninth tergite with its narrow upper part retracted within the seventh and eighth tergites; lateral angles dilated, forming triangular plates. Anal plates small, upper surfaces set with a number of stout socketed teeth. Apical angles from side acutely produced. Loosely attached to the lower margin is a rather irregularly quadrate plate, whose apex carries a row of closely set teeth. Tenth sternite reduced, shaped rather like a staple, with the lower angles a little dilated. Parameres fused, with a short stem and a large quadrate head whose apical margin is excised. Dorsal surface bears a pair of basally directed teeth. Ninth sternite short, triangular in ventral aspect.

Length of anterior wing 4·8 mm., posterior wing 3·7 mm.

Queensland, Cairns, 27. vi. 30; 1 ♂. N. Queensland, Ingham, 23. iv. 30, 10. vi. 31 (*L. Franzen*), 2 ♂♂; Tully, 12. vi. 31 (*L. Franzen*), 2 ♂♂, all from the Tillyard, collection.

I have chosen as type the male from Cairns.

HEMEROBIELLA, gen. nov. (Figs. 9 & 10.)

Head from the side somewhat produced downwards, giving a slightly rostrate appearance. Fore wing oval, apex rounded. Costal area broad, rather suddenly dilated at the base; recurrent veinlet present. One basal and one apical cross-vein in subcostal area. Three branches to *Rs*. Basal cross-vein between *R* and *M* very small and close to base. M_{3+4} bent towards Cu_1 at connecting cross-vein. Two series of gradate veins. Hind wing with the basal part of the upper branch of

Rs bent towards and connected with R_1 by a cross-vein. Two series of gradate veins, inner series represented by one cross-vein. Cu_2 absent. Tenth sternite of male forming an internal, dorsally arched plate, ædeagus unpaired. Parameres fused basally.

Female unknown.

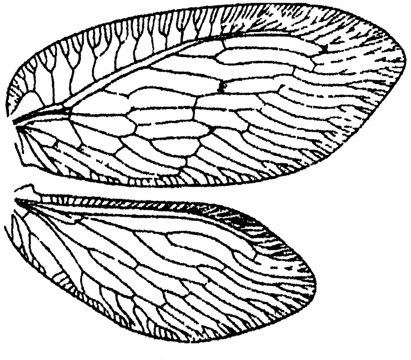
Genotype : *H. sinuata*, sp. n.

At first glance the type-species resembles a large *Notiobiella*, but the wing-venation is more that of *Hemerobius* though more open. The unpaired ædeagus and basally fused parameres recall those of *Kimminsia*, but the inferior distal processes of the tenth sternite are lacking.

Hemerobiella sinuata, sp. n.

♂.—Body-colour fulvous ; a piceous spot on the vertex behind each antenna, the basal segment of which is marked with a piceous line externally. Prothorax produced anteriorly, anterior margins marked with piceous. Anterior wing yellowish hyaline, much irrorated with fuscous. Venation pale with fuscous markings, three cross-veins heavily marked with dark fuscous, the anterior in the outer gradate series and the second and fifth in the inner series. The cross-vein between the basal branch of *Rs* and M_{1+2} merges into a whitish fenestrate spot. Branches of *Rs*, particularly the basal, and the veins in the apical third of the wing sinuously curved. Posterior wing paler than anterior, not irrorated, but with a slight fuscous cloud behind the pterostigma

Fig. 9.



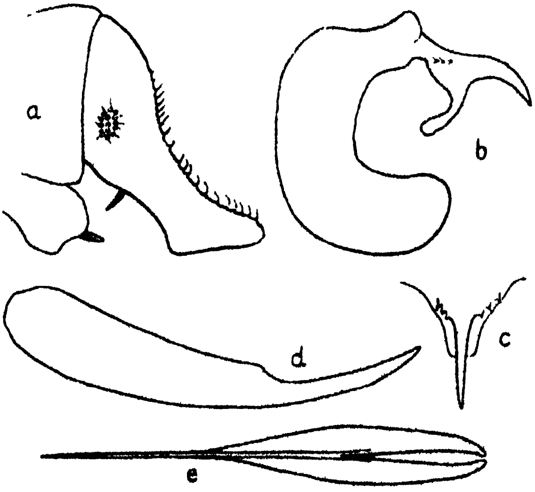
Hemerobiella sinuata, sp. n., ♂. Wings.

and a narrow fuscous band along the anal and cubital margins.

Anal plates elongate, directed obliquely downwards, in lateral aspect constricted before the apex, which has somewhat the shape of a foot. From above they are curved towards each other, the lower angles produced and rounded. Upper margins and lower angles set with stiff bristles.

Tenth sternite deep, lateral wings strongly reniform, linked by a narrow bridge. Ædeagus slender, slightly downcurved, arising from a triangular plate whose apex is blunt and curled downwards. Parameres simple, fused for about two-thirds of their length, apices slightly up- and incurved. Hypandrium shallow.

Fig. 10.



Hemerobiella sinuata, sp. n., ♂.

a, apex of abdomen, lateral; *b*, tenth sternite, lateral; *c*, apex of median process, dorsal; *d*, parameres, lateral; *e*, the same, dorsal.

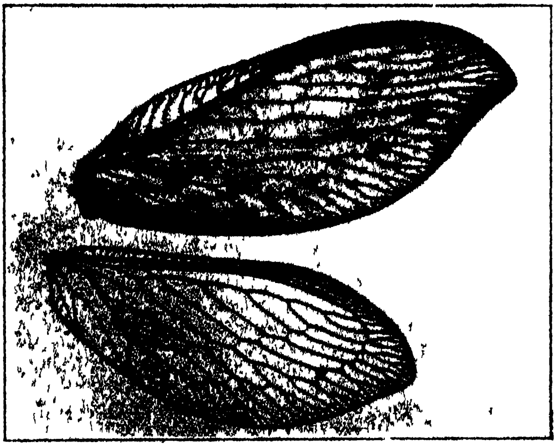
Length of anterior wing 10 mm., posterior wing 8·5 mm.

Ecuador, Intaj, 1 ♂, ex coll. McLachlan.

Nusalala falcata, sp. n. (Figs. 11 & 12.)

♂.—Head and antennæ fulvous, vertex and palpi darker; pronotum broader than long, rounded anteriorly; two deep transverse furrows; fulvous, with golden pubescence and a number of long black setæ on the margins and central ridge. Meso- and metathorax fulvous, with golden and black hairs. Legs fulvous, anterior and median femora and tibiæ each with two, posterior with one black ring. Anterior wing brownish hyaline, shaded with dark brown behind the tip, two small distinct spots near apex of wing, others on radius at branches, on cubital, and on some of outer forks. A dark area over the recurrent humeral vein. Wing elongate, apex falcate, venation pale speckled with brown. Posterior wing hyaline with pale venation, except posterior branch of Cu_1 and some outer forks of radial branches. Wing elongate, apex acute but scarcely falcate.

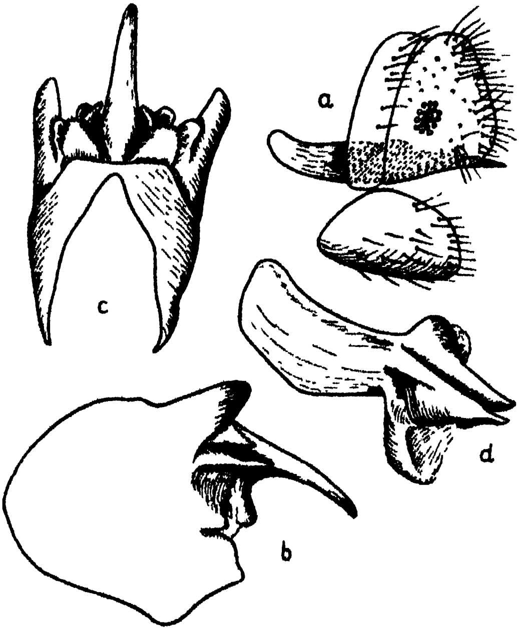
Fig. 11.



Nusalala falcata, sp. n., ♂. Wings.

Ninth tergite narrow, divided dorsally. Anal plate roughly triangular, upper and apical angles rounded, the latter bearing a short acute spine. Lower margin thickened and considerably produced basally in a flattened rib. Tenth sternite with large side-lobes, very narrow dorsally and bearing five processes. The median is long and slender, curving slightly downwards; at its base the lower surface is produced downwards in a pair of blunt divergent fingers. On each side of the median process is a small plate-like process with serrate margins, and beneath them is another pair of processes with acute convergent apices. Parameres fused basally, apices acute and divergent. Upper margins triangularly dilated,

Fig. 12.



Nusalala falcata, sp. n., ♂.
a, ninth segment and anal plate, lateral (less enlarged) ; *b*, tenth sternite, lateral ; *c*, the same, dorsal ; *d*, parameres, dorso-lateral.

and beneath these expansions are two rounded membranous lobes.

Length of anterior wing 10·5 mm., posterior wing 9 mm.

Type ♂, paratype ♀, Brazil, Rio Grande do Sul, from the McLachlan collection.

XIX.—*On some new Brazilian* Microcylloepus, *with a Key to the Species* (*Coleoptera*, Elmidæ). By H. E. Hinton, Ph.D. (Department of Entomology, British Museum (Natural History)).

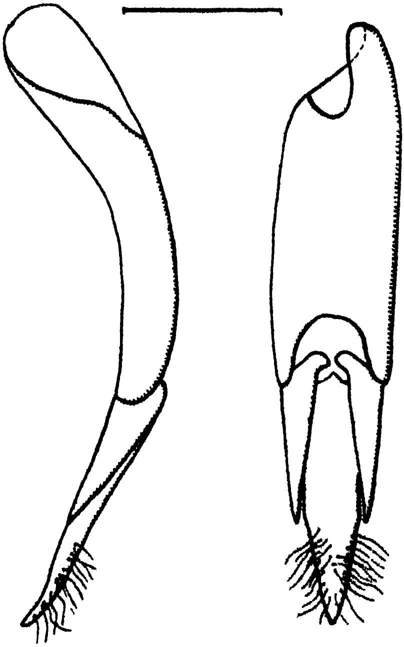
In my recent synopsis (1940) of the Brazilian species of *Microcyllœpus* I failed to include three new forms and one already described in the genus *Cyllœpus*. In 1937, when *Cyllœpus immsi* Hinton was described, it was pointed out that it had the general appearance of *Microcyllœpus.* At that time the generic importance of such characters as the wing venation was unknown. A recent study of the wing venation and other differences between the two genera makes it clear that *Cyllœpus immsi* should be transferred to the genus *Microcyllœpus* Hinton. The three new species described in this paper belong in the group of *M. immsi*, and certain alterations of the generic diagnosis must be made in order to include them.

The pronotum may have the apical transverse impression entirely confined to sides near lateral margins instead of extending part or all of the distance across disk. The median longitudinal impression of the pronotal disk is not always deep and distinct, but, on the contrary, may be absent, as is the case in *M. femoralis*, sp. n., and *M. ochus*, sp. n. The oblique impression may be (all members of group of *M. immsi*) entirely confined to sides near sublateral carinæ. The hind wing of *M. ochus*, sp. n., has been examined. The venation differs from the typical members of the genus in very slight characters, which may be considered to be of specific and not of generic importance. The third anal is short and does not join the second. The second anal, as usual, has both the first and third branches well developed. The cubito-anal cross-vein is complete and joins the cubitus to the first branch of the second anal.

The figures were drawn with the aid of a camera lucida; and lines next to illustrations refer to a length of 0·20 mm.

Microcyllœpus sparsus, sp. n. (Figs. 1 & 2.)

Male.—Length 2·02 mm.; breadth 0·82 mm. Cuticle shining, black to dark rufo-piceous; antennæ, mouthparts, and legs paler rufo-piceous. *Head* without distinct impressions; surface with punctures only slightly finer than facets of eye, seldom separated by as much as one diameter, and frequently (particularly near sides) confluent; surface also with numerous very much finer, microscopic punctures. Clypeus with fronto-clypeal suture distinct and straight; anterior margin scarcely noticeably arcuately emarginate for its entire breadth and angle on each side broadly rounded; surface sculptured like sides of head near eyes. Labrum with anterior margin feebly, arcuately emarginate at middle and angle on each side broadly rounded; surface at extreme base smooth, but elsewhere on basal half transversely, very finely alutaceous, and on anterior half with a few sparse microscopic punctures. *Pronotum* across basal two-fifths, which is broadest point, as broad as long (0·65 mm.) and base broader than apex (0·57 mm.: 0·46 mm.). Sides broadly, moderately feebly sinuate at apical two-fifths and broadly and more shallowly sinuate before basal angles. Sublateral carinæ prominent, inner side sharp, and extending from base to apex. Disk with median longitudinal depression deep, oval, 0·22 mm. long and 0·137 mm. broad; with highest point of disk at middle just behind median depression; without trace of median longitudinal carina; impressions near base on each side



Microcyllœpus sparsus, sp. n.

Fig. 1.—Lateral view of male genitalia.
Fig. 2.—Dorsal view of same.

of scutellum oval, deep, about two-thirds as broad as scutellum, and separated by distinctly more than breadth of scutellum; apical transverse impression distinct at sides between sublateral carinæ and lateral margins, very shallow and scarcely noticeable on inner side of sublateral carinæ, and completely absent from middle of disk; oblique impressions broad, moderately shallow, and on disk confined to sides near sublateral carinæ; surface of disk with round punctures about two-thirds as coarse as facets of eyes and separated by one to two diameters; surface between punctures usually smooth; towards base punctures become sparser and slightly finer; surface on anterior half between sublateral carinæ and lateral margins with punctures slightly finer and often confluent, so that surface appears feebly rugose and surface between punctures often feebly, microscopically alutaceous. *Elytra* twice as long as pronotum (1·35 : 0·65 mm.) and across broadest point, which is about at apical two-fifths, broader than broadest point across humeri (0·82 : 0·71 mm.). Epipleura without tomentum. Sublateral carinæ prominent, inner extending to apical two-fifths. Humeri feebly gibbous. Apices broadly, strongly produced and conjointly, broadly rounded. Discal striæ nowhere distinct, very feebly impressed apically; strial punctures on disk very deep, round to subquadrate, as broad to a third broader than intervals, and usually separated longitudinally by half to one diameter. Intervals with third broadly and moderately strongly convex on basal seventh, other intervals flat or very feebly convex; surface of intervals with microscopic punctures (about a fourth as coarse as facets of eyes) separated by three to ten diameters; surface on humeri with an occasional round granule about as coarse as an eye-facet. *Scutellum* feebly convex, obovate, longer than broad (0·109 : 0·08 mm.), and surface punctate like elytral intervals. *Prosternum* when seen from side with anterior three-fifths (not including process) feebly and gradually bent ventrally; prosternal carinæ present on basal three-fifths, prominent, sharp, at base slightly wider apart than sides of process, and only feebly diverging anteriorly. Hypomera with an occasional low, round granule about as coarse as an eye-facet and feebly transversely rugose, particularly on anterior fourth, which is also very densely punctate. *Mesosternum* with postero-lateral sides very strongly gibbous, the top of gibbous portion being on each side oval, only feebly convex, and having on inner side dense, fine hairs. Metasternum with disk strongly depressed; median longitudinal line about as broad as apex of middle tibia, with sides gradually sloping downwards, deep, and extending to about anterior eighth; disk on each side with a deep, oval depression occupying most of posterior two-fifths; surface of disk punctate like elytral intervals, but slightly more coarsely and densely so. *Abdomen* with the middle region of first sternite steeply sloping downwards from posterior to anterior margin; surface with punctures one-half to two-thirds as coarse as facets of eyes and separated by one to three diameters; lateral carinæ feeble and only extending halfway to posterior margin of segment. Surface of middle region of sternites two to four non-tomentose and punctate similarly, but more finely and sparsely than that of first. *Legs* with front femora not tomentose on apical two-fifths of ventral and anterior sides; middle femora with apical two-fifths of anterior side and all of ventral side not tomentose; hind femora tomentose like middle femora. *Genitalia* as figured (figs. 1 & 2).

Female.—Externally similar to male except that the postero-lateral sides of the mesosternum are not gibbous nor have they a dense fringe of fine hairs on inner side, the metasternal disk is not noticeably depressed, and the middle region of first abdominal sternite is only moderately feebly depressed anteriorly.

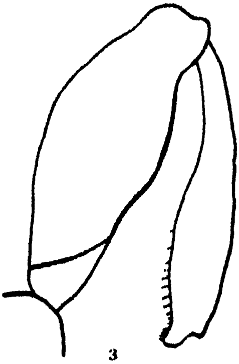
Type.—A male in the collection of the British Museum (Natural History). Brazil: Santa Catharina, Nova Teutonia, i. 1939 (*F. Plaumann*).

Paratype.—A female with same data as above.

Comparative Notes.—This species is closely related to *M. immsi* (Hinton), but may be distinguished as follows:—(1) The punctures of the pronotal disk are distinctly finer than the facets of the eyes, whereas in *immsi* they are as coarse (in the original description of *immsi* it was stated in error that they were only a third as coarse as facets of eyes); (2) the inner sublateral carina of the elytra extends only to apical two-fifths, whereas in *immsi* it extends to apical fourth; and (3) the male has each postero-lateral side of the mesosternum strongly and broadly gibbous, nearly flat-topped, and without a tubercle, whereas in *immsi* this gibbous region has a dorsal, obtuse tubercle.

Microcyllœpus femoralis, sp. n.
(Figs. 3 & 6.)

Male.—Length 2·60 mm.; breadth 1·04 mm. Cuticle shining, black to rufo-piceous; antennæ, mouth-parts, and legs paler rufo-piceous (the type is slightly immature and has the elytra as pale rufo-piceous as the legs). *Head* without distinct impressions; surface with round punctures (nearly as coarse as facets of eyes) which on middle region are often separated by as much as one diameter, but anteriorly and towards sides they become much denser, here being usually confluent; surface between coarse punctures with numerous microscopic (about one-fourth as coarse as facets of eyes) punctures. Clypeus with fronto-clypeal suture deep and straight; anterior margin scarcely noticeably, arcuately emarginate for its entire breadth, and angle on each side obtusely rounded; surface punctate similarly to middle anterior region of head. Labrum with anterior margin nearly truncate and angle on each side broadly rounded; surface on basal third very finely, densely, transversely alutaceous, and elsewhere with microscopic punctures usually separated by one to ten diameters. *Pronotum* across broadest point, which is at basal two-fifths, broader than long (1·01 : 0·93 mm.) and base broader than apex (0·79 : 0·54 mm.). Sides broadly, moderately feebly sinuate at apical fourth and again before hind angles. Sublateral carinæ prominent, inner side sharp, and extending from base to apex. Disk evenly convex, without trace of median longitudinal impression or carina in front of scutellum; with highest point of disk at middle basal fourth; oblique impression shallow, broad, and on disk confined to side near sublateral carina; apical transverse impression entirely confined to sides near lateral margins; impressions near base on each side of scutellum deep, oval, about half as broad as scutellum, and separated by little more than breadth of scutellum. Surface of disk with round punctures slightly finer than facets of eyes and separated by one to two diameters; towards base these become slightly finer and sparser, but towards sides coarser and denser, so that near sublateral carinæ they are occasionally slightly coarser than facets of eyes; surface between punctures smooth; surface between sublateral carinæ and lateral margins similarly punctate, but near



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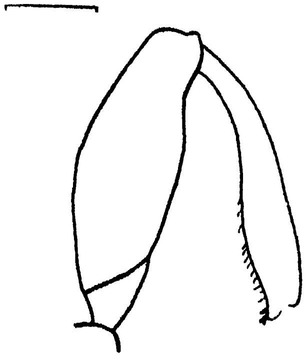

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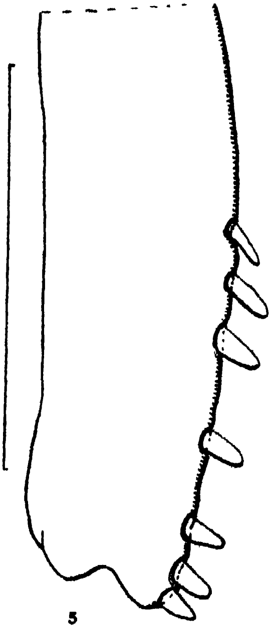

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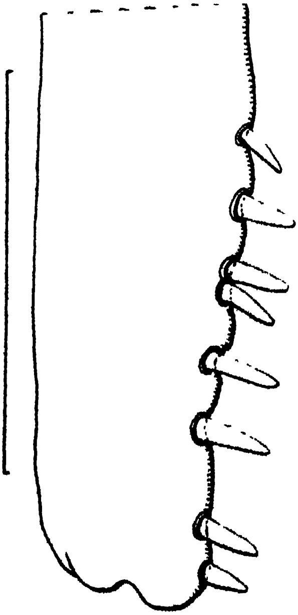

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Fig. 3.—Front view of right leg of *Microcyllæpus femoralis*, sp. n.
Fig. 4.—Same of *M. ochus*, sp. n.
Fig. 5.—Posterior view of apex of right middle tibia of *M. ochus*, sp. n.
Fig. 6.—Same of *M. femoralis*, sp. n.

base the punctures are even finer than basal ones of disk, and on anterior half surface is feebly rugose and besides normal punctures has occasional microscopic ones. *Elytra* nearly twice as long as pronotum (1·7 : 0·93 mm.), and across broadest point, which is at about apical two-fifths, distinctly broader than broadest point across humeri (1·04 : 0·90 mm.). Humeri moderately gibbous. Epipleura without tomentum. Apices broadly, strongly produced and conjointly, broadly rounded. Sublateral carinæ prominent, inner not quite as prominent as outer in apical region and extending to apical third. Discal striæ deeply impressed at base and elsewhere very shallow; strial punctures on middle of disk deep, round to subquadrate, as broad to two-thirds as broad as intervals, and separated longitudinally by half to one diameter. Intervals with third broadly, moderately convex on basal eighth though flat at extreme base; second moderately convex for a short distance behind scutellum; fourth feebly convex for a short distance well behind base; and other intervals flat. Surface of intervals with microscopic (a fourth to a third as coarse as facets of eyes) punctures separated usually by three to five diameters; humeri with an occasional low, round granule about as coarse as an eye-facet. *Scutellum* moderately feebly convex, subovate, longer than broad (0·137 : 0·109 mm.), and surface punctate as adjacent elytral intervals. *Prosternum* when seen from side with anterior three-fifths (not including process) moderately feebly and gradually bent ventrally; prosternal carinæ moderately prominent, not sharp, present on basal three-fifths, at base slightly wider apart than sides of process, and feebly diverging anteriorly. Hypomera with sparse, low, round granules, which are about as coarse as facets of eyes, or slightly finer, and surface densely, irregularly punctate, so that it has a finely but irregularly rugose appearance. Mesosternum with postero-lateral sides strongly elevated above general surface, strongly produced backwards, and dorsal surface of produced portion densely clothed with fine, golden-testaceous, short hairs. Metasternum with disk very strongly depressed on posterior three-fifths and at anterior two-fifths appearing transversely gibbous, the posterior middle portion of the gibbous region being nearly vertical; median longitudinal line broad, deep, and extending to anterior two-fifths; on each side of middle with a broad, oval, moderately deep depression; surface of disk with punctures about as coarse as those of pronotum, but more irregularly distributed, and surface also feebly rugose. *Abdomen* with the middle region of first sternite steeply sloping downward from posterior fourth to anterior margin; surface with punctures slightly finer than to as coarse as facets of eyes, and separated usually by one (seldom by two) diameters; lateral carinæ moderately prominent and extending to posterior third of segment. Surface of middle region of sternites two to four non-tomentose and similarly, but slightly more finely-and sparsely punctate than that of first. *Legs* with front femora very much thickened (fig. 3) and tomentose, except on apical half of anterior side and apical two-thirds of ventral side; tibia with apical two-fifths dilated and thickened, the inner side of this part being feebly concave, nearly flat. Middle femora with all of ventral and apical third of anterior and dorsal sides non-tomentose; tibia on postero-ventral side of apical third with a variable number of short, stout teeth (fig. 6). Hind femora with all of ventral and apical third of dorsal and anterior sides non-tomentose; hind tibia with inner spur moderately feebly curved forwards.

Female.—Externally similar to male except as follows:—(1) Apices of elytra strongly produced as in male, but not conjointly rounded, and not contiguous at extreme apex, but, on the contrary, each apex is acute; (2) postero-lateral sides of mesosternum not as strongly elevated or produced behind as in male; (3) disk of metasternum not as deeply depressed; (4) depression on each side of metasternal disk deeper and not as broad; (5) middle region of first abdominal sternite less strongly depressed; (6) front femora, as usual in the genus, not strongly swollen as in male; (7) front tibia with apical region not dilated nor with ventral side flattened; (8) middle tibia without a row of teeth on postero-lateral side of apical third; and (9) hind tibia with inner spur shorter, straight, and not curved forwards as in male.

Type.—A male in the collection of the British Museum (Natural History). Brazil: Santa Catharina, Nova Teutonia, 1936 (*F. Plaumann*).

Paratypes.—Two males and two females with same data as above.

Comparative Notes.—This may be distinguished from all other previously described species by the absence of a median longitudinal impression on pronotal disk.

Microcylloepus ochus, sp. n. (Figs. 4 & 5.)

Male.—Length 2·68 mm.; breadth 1·01 mm. Cuticle shining, black to rufo-piceous; antennæ, mouth-parts, and legs moderately pale rufo-piceous. Externally similar to *M. femoralis* except in the following particulars:—(1) The metasternum has the posterior middle portion of the gibbosity gradually sloping behind instead of nearly vertical as in *femoralis*; (2) the punctures of middle region of first abdominal sternite are distinctly finer than facets of eyes and frequently (in some specimens nearly always) separated by two diameters, whereas in *femoralis* these punctures are often about as coarse as facets of eyes and are seldom separated by as much as two diameters; and (3) the front femora are only moderately stout (fig. 4), whereas in *femoralis* they are very stout (fig. 3).

Female.—Differs from male in precisely the same particulars as the female of *femoralis* differs from its male. It may be distinguished from the female of *femoralis* by having the posterior middle portion of the metasternal gibbosity gradually sloping behind instead of being nearly vertical, and by the finer and sparser punctures of the middle region of the first abdominal sternite.

Type.—A male in the collection of the British Museum (Natural History). Brazil: Santa Catharina, Nova Teutonia, iii. 1936 (*F. Plaumann*).

Paratypes.—One male and three females with same data as above.

A Key to the Brazilian Species of Microcylloepus.

1.	Elytra with a large transverse tubercle at base on each side of scutellum. Femora entirely clothed with very fine and dense tomentum. (Manaos.)	*M. pustulatus* Hinton.
	Elytra without a tubercle at base on each side of scutellum. Femora nearly always with at least apical fourth free of tomentum	2.
2.	Epipleura without tomentum	3.
	Epipleura with at least basal region tomentose	8.
3.	Pronotal disk with oblique impression of basal third deep and extending nearly to middle of disk; pronotum always with a distinct median longitudinal impression: in front of scutellum with a distinct median longitudinal carina	4.
	Pronotal disk with oblique impressions of basal third shallow and confined to sides near sublateral carinæ; with or without	

a median longitudinal impression; without trace of a median longitudinal carina at base in front of scutellum .... 5.

4. Male with ventral apex of first segment of front tarsus strongly, acutely produced, and apex of produced portion with a long acute spine; inner spine of hind tibia very long, slender, and slightly curved forwards. Female with a moderately strongly gibbous area near middle apex of fifth abdominal sternite. (Nova Teutonia.) .... *M. spinipes* Hinton.

   Male with ventral apex of first segment of front tarsus not produced; inner spur of hind tibia short and nearly straight. Female with middle area near apex of fifth abdominal sternite not gibbous. (Mexico, Guatemala, Brazil (Nova Teutonia).) .... *M. inæqualis* (Sharp).

5. Pronotal disk with a broad and deep median longitudinal impression .... 6.

   Pronotal disk without a median longitudinal impression .... 7.

6. Punctures of pronotal disk as coarse as facets of eyes. Inner sublateral carinæ of elytra extending to apical fourth. Male with postero-lateral side of mesosternum with a large obtuse tubercle. Front tibia moderately strongly curved. (Nova Teutonia.) .... *M. immsi* (Hinton).

   Punctures of pronotal disk distinctly finer than facets of eyes. Inner sublateral carinæ of elytra only extending to apical two-fifths. Male with postero-lateral side of mesosternum convex, elevated, nearly flat-topped, and without a tubercle. Front tibia feebly curved. (Nova Teutonia.) .... *M. sparsus*, sp. n.

7. Metasternal disk with posterior middle portion of gibbosity nearly vertical. First abdominal sternite with punctures about as coarse as facets of eyes and seldom separated by two diameters. Male with front femora very stout (fig. 3). (Nova Teutonia.) .... *M. femoralis*, sp. n.

   Metasternal disk with posterior middle portion of gibbosity gradually sloping behind. First abdominal sternite with punctures distinctly finer than facets of eyes and frequently (in some specimens nearly always) separated by two diameters. Male with front femora moderately stout (fig. 4). (Nova Teutonia.) . *M. ochus*, sp. n.

8. Pronotum with numerous granules on basal three-fifths of disk. Elytra entirely black; fourth interval feebly convex near base. (Nova Teutonia.) .... *M. granosus* Hinton.

   Pronotum with disk entirely punctate. Elytra with the humeri reddish brown; fourth interval flat at base .... 9.

9.	Species large, 2·0 mm. or more. Disk of pronotum without a distinct median carina in front of scutellum. Elytra with third interval near base very strongly convex. (Nova Teutonia.)............	*M. grandis* Hinton.
	Species small, 1·8 mm. or less. Disk of pronotum with a distinct though low median carina in front of scutellum. Elytra with third interval near base feebly to moderately strongly convex...	10.
10.	Epipleura tomentose only up to posterior margin of metasternum. Male with dorsal side of front and middle tibia gibbous near middle. (Nova Teutonia.).	*M. plaumanni* Hinton.
	Epipleura tomentose up to middle of third abdominal sternite. Male with dorsal side of front and middle tibia nowhere gibbous. (Nova Teutonia, Theresopolis.)	*M. longipes* (Grouv.).

XX.—*On the Occurrence of* Gammarus (Marinogammarus) obtusatus *Dahl and* G. finmarchicus *Dahl* (*Crustacea, Amphipoda*), *new to Ireland.* By RANALD MACDONALD.

THESE two species were described by Dahl (1) from specimens collected in Finmark by the 'Gunnerus' Expedition of 1937, led by Dr. Carl Dons.

Since the appearance of Dahl's original paper *G. obtusatus* has been recorded from a number of British localities by Reid (2), but neither it nor *G. finmarchicus* have so far been recorded from Ireland. The Irish specimens of both species closely resemble Dahl's figures, except that the terminal spines of the first joint of the outer ramus of the third uropod of the Irish *G. finmarchicus* seem to be somewhat longer and narrower than in the specimen figured by Dahl, while the teeth on the sixth joint of the first gnathopod of the Irish male of *G. obtusatus* appear to be a little larger than in the specimen in the original figure.

Habitat.—Both the above occur in the littoral zone, and while both species probably are found in association with *G. marinus* Leach, *G. obtusatus* is the only one which I have as yet taken along with it. *G. finmarchicus* occurred in one locality in association with *Cladophora* and in another with *Enteromorpha.*

Localities.—*G. obtusatus* has been taken from the following Irish localities :—Angus Rock, Strangford Loch ; Kilclief ; Garrahan Isle, Groomsport ; and Whitehead. The first three localities are in Co. Down, while the last is in Co. Antrim. *G. finmarchicus* has been taken from the two following localities in Co. Down, namely, Angus Rock, Strangford Loch, and Chapel Bay, Great Copeland Island.

My thanks are due to Mrs. E. W. Sexton, F.L.S., of Plymouth, for examining the Copeland Island and Groomsport specimens, and to Mr. J. G. MacWilliams for supplying me with the latter.

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L. B. LYMAN. *The Invertebrates: Protozoa through Ctenophora.* London: McGraw-Hill Publishing Co., 1940. 726 pp., 221 figs. Price 46*s*.

THE author intended to present an advanced textbook on invertebrates in three volumes, but the first volume had to be published in two parts, of which the present is the first, and comprises Protozoa and the lower Metazoa up to Ctenophora. A textbook of this type and scope has been long awaited by the special zoology students, since Lankester's 'Treatise in Zoology' is greatly out of date, while Kükenthal's 'Handbuch der Zoologie' is not in English.

A feature of the present book is an exceptionally large number of illustrations (most of the 221 figures are really full-page plates), which are practically all original and not diagrammatic, but sufficiently true to life to serve for identification. Its second virtue is the introduction of concise and up-to-date discussions of the physiological aspects, parallel with the morphological ones. Finally, each chapter ends with a long bibliography, which is thoroughly up to date and will be found invaluable by research workers. The whole treatise when published promises to be a unique reference book, most useful not only to an advanced student, but also to a lecturer preparing his lectures, and its place in all zoological libraries is assured by the excellence of the first published part. It might be added that the book is practically free from Americanisms, although a startling one figures in the title.

WHITTARD Ann. & Mag. Nat. Hist. S. 11. Vol. VI Pl. IV.

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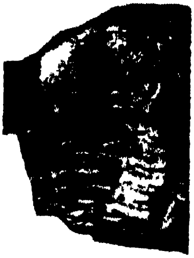
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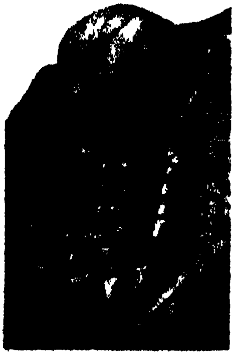
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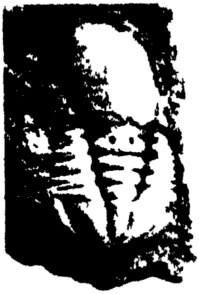
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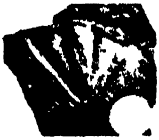
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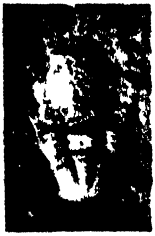
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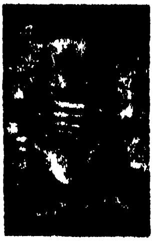
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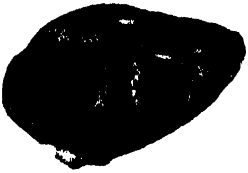
WHITTARD *Ann. & Mag. Nat. Hist. S. 11 Vol. VI. Pl. VI.*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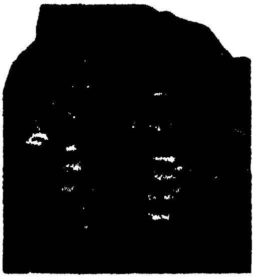
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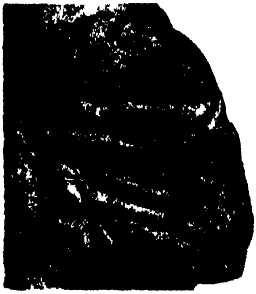
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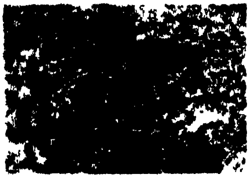
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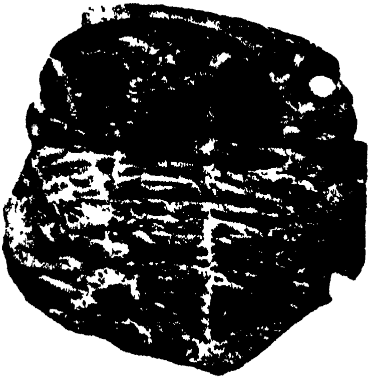
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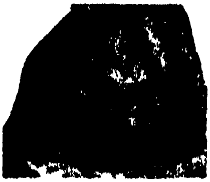
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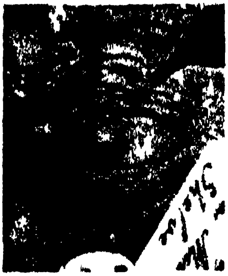
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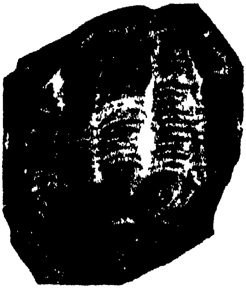
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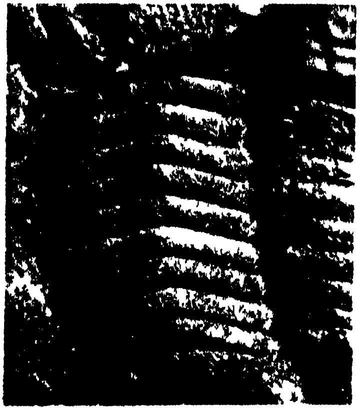
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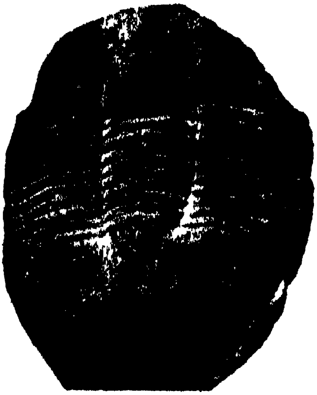
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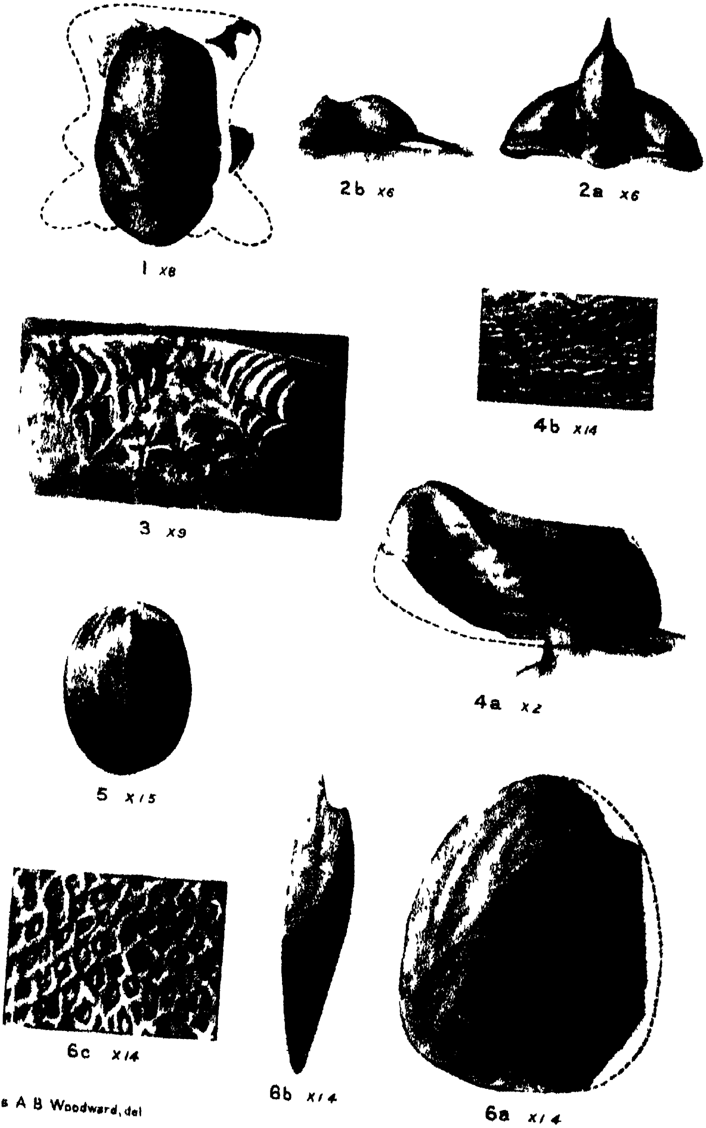
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NEW ORDOVICIAN FOSSILS FROM GIRVAN

THE
ANNALS AND MAGAZINE
OF
NATURAL HISTORY.

[ELEVENTH SERIES.]

No. 33. SEPTEMBER 1940.

XXI.—*On some Jurassic Specimens of* Sagenopteris.

By Tom M. Harris, University of Reading.

This paper describes various sorts of *Sagenopteris* leaves and a small stem from the Middle Estuarine (Lower Oolite) of Cayton Bay, Yorkshire. They were collected by Mr. F. M. Wonnacott and deposited by him in the Geological Department of the British Museum.

In a well-known paper Thomas (1925) established the Caytoniales for two types of fruit from this locality; and with these he associated a microsporophyll and the leaf *Sagenopteris*. He was concerned with major features of morphology, and pointed out that much remained to be found out; in particular the stem was unknown and the leaves of the two species very imperfectly differentiated. Thomas's reference of *Sagenopteris* to the Caytoniales has been doubted by some, but supporting evidence was forthcoming (Harris, 1933) from a Liassic Caytonialean, and I hope later to publish new evidence from the fruits in the present collection. Nothing indeed in this paper conflicts with any important conclusion of Thomas's.

The *Sagenopteris* leaves in this collection have been divided into the two species, *S. phillipsi* (sensu stricto) and *S. colpodes*; the one being the leaf of *Gristhorpia*, the other of *Caytonia*. Thomas suggested this, but did not carry it through, leaving the bulk of the specimens unplaced; but now, as the result of some lucky finds and a slightly modified technique, all the available specimens have been sorted. Thomas's difficulty was that the leaves showed a continuous range of form variants, and though he succeeded in recognizing some different types of cuticle, the majority of his leaves yielded no satisfactory cuticles. The lucky finds were some specimens with particularly well-preserved cuticles; the new technique made it easy to recognize certain strongly contrasted characters of the cuticles even in the poorest specimens. Fortunately it is the thicker upper sides which show these characters best.

The new technique is as follows:—a fragment of not more than ¼ sq. mm. is taken from the lamina (the margin is best), and it is mounted in HNO_3 saturated with $KClO_3$ under a coverslip It is left 12 hours, or the oxidation can be completed in 15 minutes in an incubator at 60° C. The coverslip is irrigated with NH_4OH or $NaOCl$ (acid being removed by blotting-paper). The oxidized mesophyll soon dissolves, and the cuticles separate sufficiently if the coverslip is jerked; hot glycerine jelly can, if necessary, be sucked in afterwards. The cuticle obtained is, of course, a small piece, but it will show plenty of the characteristic cells of the upper epidermis. About ten leaves can be examined in this way in an hour.

This technique yields better results than when larger fragments of lamina are macerated. It was observed that the acid scarcely acts through the intact cuticle, but chiefly at cracks and broken edges, where the mesophyll is exposed. Thus with a small piece the oxidation of the mesophyll is soon completed; in consequence, the destruction of the cuticle by oxidation, which proceeds at the same time but more slowly, will not have gone far; with a delicate and ill-preserved cuticle such destruction cannot be afforded. The convenience of this technique and its comparative harmlessness to the specimen are obvious.

Sagenopteris colpodes, sp. n.

The following specimens from Yorkshire resemble *S. colpodes* in their broad leaflets, but are not known to have identical cuticles.

1833. *Glossopteris phillipsi* Brongn.: Lindley & Hutton, p. 177, pl. lxiii. fig. 1.

1900 *a*. *Sagenopteris phillipsi* (Brongn.) : Seward, p. 16, text-fig. 25.
1925. *Sagenopteris phillipsi* (Brongn.) : Thomas, p. 334, pl. xv. fig. 51 (it is not clear whether the cuticles of this or a similar specimen is figured in text-fig. 12 *c, d*) ; pl. xv. fig. 49, shows a petiole of identical cuticle structure.

Holotype.—V.26441.

Diagnosis.—Leaf consisting of a petiole bearing four broadly ovate leaflets, upper leaflets nearly symmetrical, lower ones with the midrib nearer the upper margin. Leaflets typically about half as broad as long, apex obtuse, base showing a very minute stalk. Midrib conspicuous below but disappearing near the apex, veins prominent on the lower side, flush with the surface on the upper, forming a network which grows finer near the margin. Surface of leaf conspicuously sculptured, upper side showing bulging points in rows parallel with the veins, lower showing bars transverse to the veins. Hairs not apparent on surface.

Cuticle rather thin, lower thinner than the upper ; the upper showing cells of more or less rectangular shape, those over the veins elongated parallel with the veins, those between often transversely elongated ; walls of all cells only moderately distinct, sinuous or with jagged thickenings ; surface of cells obscurely sculptured. Lower cuticle showing cell outlines indistinctly, cells along the veins elongated, those between irregular and sinuous walled ; stomates oval, with a fine but distinct outline. Subsidiary cells unspecialized, their inner cutinized walls not extending under the guard cells. Surface of guard cells showing an oval " vorhof," surface sometimes showing fine radiating striations. Trichomes frequent, especially along veins, consisting of a small thickened cell with a bulging surface.

Petiole showing similar trichomes on the underside, cells rectangular, in longitudinal rows, lateral walls showing jagged thickenings.

The name refers to the sinuous cell-walls.

S. colpodes is less abundant in this collection than *S. phillipsi* ; all the best specimens have been figured ; but with these specimens are smaller leaf fragments of the same species ; thus on the bedding plane with V.21886 are fragments of four other leaves and a *Caytonia* fruit, but no other species.

The cuticle of this species is thinner than that of

S. phillipsi and its cell outlines are less distinct, but sinuous cell-walls are usually conspicuous near the leaf margin. The difficulty of ascertaining the nature of the epidermal cell-walls is sometimes increased by the preservation of straight-walled palisade cells and the existence of wrinkles along the veins and margins caused by crushing. In some leaves too the surface bears a thin and irregularly broken layer of wax.

Mesophyll.—The surface sculpture has been already mentioned; this is due not to the epidermis but to unequal thickness of the interior of the leaf. On maceration some specimens behave normally, yielding nothing but the cuticle; others yield, at least in places, some internal tissue which adheres to the cuticles and tends to conceal their cell outlines. The bulges of the upper side are now represented by large squarish cells between which intercellular spaces occur; these cells adhere loosely to the upper cuticle, but their outlines are in no way related to those of the epidermal cells. These are regarded as palisade cells.

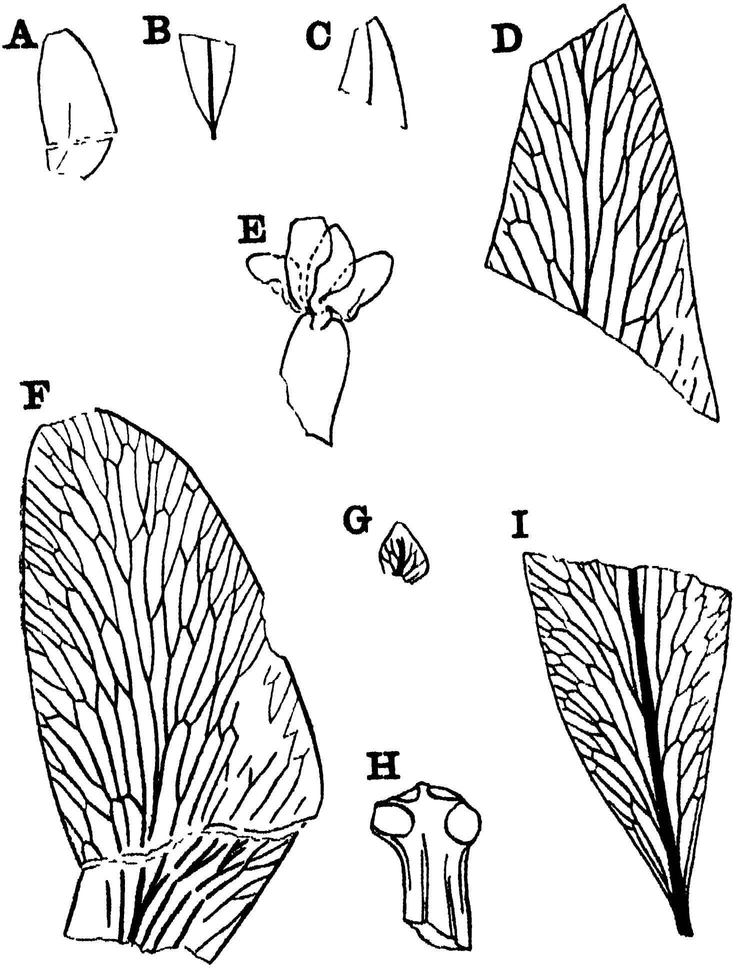
Similar, but less well-preserved walls adhering to the lower cuticle indicate transversely placed cells on the lower side of the leaf; these are regarded as cells forming a tissue which is both spongy mesophyll and transfusion tissue. The mesophyll appears to owe its preservation to the impregnation of the walls or protoplasm by oily matter, just as in the seed coat of *Caytonia.*

Petiole.—The specimen shown in fig. 1 H (obtained by bulk maceration), which shows two pairs of scars, was identified because of its general form as a *Sagenopteris* petiole and as *S. colpodes* because of its trichomes and sinuous cell-walls.

The under cuticle is slightly thinner than the upper (the side bearing the leaflet scars), and is provided with trichome bases, none of which was seen on the upper side.

The cells form longitudinal rows. The strongly marked lateral walls show sinuous thickenings like those of the upper surface of the lamina; the end walls, however, are delicate. A number of trichomes occur, consisting of a thickened basal cell (sometimes surrounded by other specialized cells) bearing a thinly cutinized hair which may project 30 μ. The surface of the cells shows the same fine sculpture as does the upper epidermis.

Fig. 1.



Sagenopteris colpodes, leaf and bract.

A, leaflet fragment shown also in F, V.24708, × 1. B, leaflet fragment shown also in I, V.26434, × 1. C, leaflet fragment shown also in D, V.26434, × 1. E, small leaf from a bulk maceration (cuticle only), V.26435, × 4. F, × 4. G, small-leaf leaflet from bulk maceration (cuticle only), V.26436, × 4. H, petiole, showing four leaflet scars, from bulk maceration, V.26437, × 8. I, as B, × 4. (Some of the finest veins in D, F, G, I have probably been missed.)

This specimen is worthy of note because while it agrees with one of Thomas's specimens (1925, p. 337, pl. xv. fig. 49), it disagrees with the one he showed in his text-fig. 12 C, D (a form with straight walls and no hairs), and which I would determine as a small leaf of *S. phillipsi* (sensu stricto). That particular specimen was figured beside the cuticle of *Caytonia sewardi* in order to demonstrate agreement in structure, but, as some others have pointed out, it shows points of disagreement. The present specimen shows far more convincing agreement with *C. sewardi*.

Small leaf.—Bulk maceration yielded two specimens of bract-like organs. One (fig. 1 E) shows a scale-like leaf base, which at its base appears to include the point of abscission. This leaf base bears at its apex a minute petiole, at the sides of which are two blunt upward extensions. The petiole bears four minute oval leaflets.

The other specimen is an isolated leaflet of similar size but more hairy. In both specimens the cuticle gives indications of the veins, which form a network closely similar to that shown for *S. phillipsi*.

The cuticle is interesting. In both specimens the lamina is more thickly cutinized than is the foliage leaf; but there is very close general agreement in structure (on this the specific identification is based).

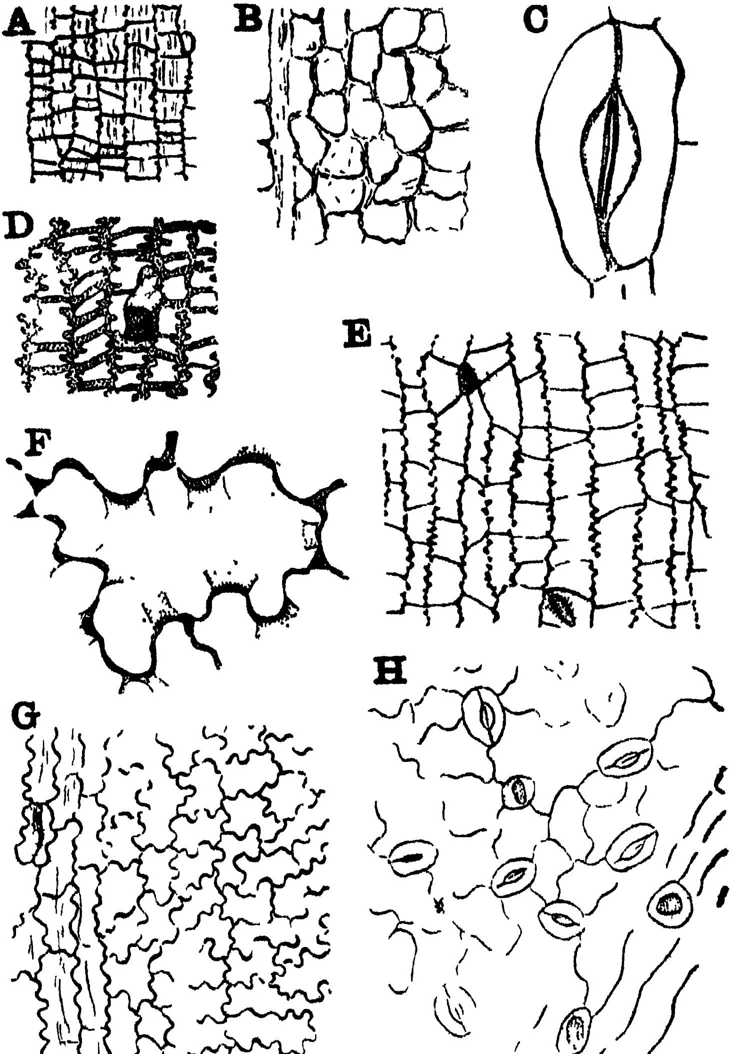
In specimen No. V.26435 (fig. 1 E) both sides are just like those of the lamina, except that the cuticle is rather thicker, the cells are smaller and form more regular longitudinal rows, their lateral walls are more distinct (especially on the lower side), and hair-bases are more numerous on the lower side and margin.

Specimen V.26436, an isolated leaflet, has an even thicker cuticle on both sides; the cell outlines on the upper side are thick and show sinuous lateral walls but straighter end walls (thus approaching a petiole in structure), while the lower side shows many hair-bases, some normal and some vestigial stomates. The margin is densely covered with hairs.

The petiole (specimen V.26435) appears to resemble the petiole of the normal leaf shown in fig. 2 E.

The expanded base has a fairly thick cuticle. The under side, which is slightly thicker, bears a good many

Fig. 2.



Sagenopteris colpodes, cuticle.

A, small-leaf base, underside, V.26435 (fig. 1 H), ×200. B, palisade cells (adhering to upper cuticle), V.24708 *a*, ×100. C, stomate of foliage leaf, V.26438, ×800. D, small-leaf base, upper side showing a hair, V.26435, ×200. E, petiole, underside, V.26437, ×200. F & G, foliage leaf upper cuticle, V.26438, F×800, G×200. H, foliage leaf, lower cuticle (a vein runs on the right), V.26438, ×200.

hairs. It shows rows of short cells with very thick sinuous lateral walls, and thick but straight end walls. The upper side shows similar cells, but the walls are less thickened and the surface is sculptured with longitudinal ridges. Few, if any, hairs occur on this side.

The unusual thickness of cuticle of this small leaf suggests that it was a protective organ formed in an exposed position. Very possibly it was a transitional organ between a bud-scale and a foliage leaf. The greater thickness of the lower cuticle of the leaf base is in agreement with this view.

Sagenopteris phillipsi (Brongn.) Presl.

The following Yorkshire specimens agree in their form with *S. phillipsi*, but their cuticles have not been examined.

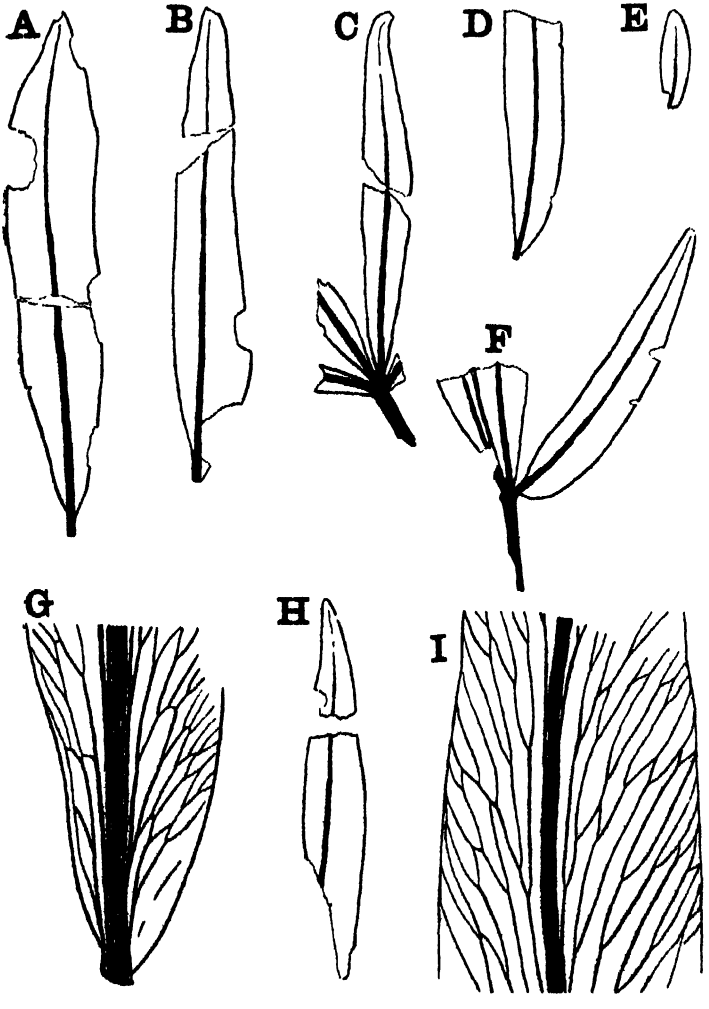
1828. *Glossopteris phillipsi* Brongniart, p. 225, pl. lxi. fig. 5 ; lxiii. fig. 2.
1829. *Pecopteris paucifolia* Phillips, p. 148, pl. viii. fig. 8.
1833. *Glossopteris phillipsi* Brongn. : Lindley & Hutton, p. 177, pl. lxiii. figs. 2, 3.
1835. *Otopteris cuneata* Lindley & Hutton, p. 203, pl. clv.
1838. *Sagenopteris phillipsi* (Brongn.) Presl, in Sternberg, p. 165.
1900. *Sagenopteris phillipsi* (Brongn.) : Seward, p. 11, pl. iii. figs. 7, 8.
1900 *a*. *Sagenopteris phillipsi* (Brongn.) : Seward, p. 162, pl. xviii. figs. 2–4 ; text-figs. 24, 26 (25 is more like *S. colpodes*).
1925. *Sagenopteris phillipsi* (Brongn.) : Thomas, p. 334, pl. xv. figs. 50, 52, 53 ; text-fig. 11 *c*, *d*, ? 12 *c*, *d*.
1939. *Sagenopteris phillipsi* (Brongn.) : Darrah, p. 339, text-fig. 174.

Seward (1900 *a*, p. 162) gives references to citations of this species in the literature and to some non-British specimens of more or less similar form, and in 1910, pp. 480–482, of some later references.

I am unwilling to express any opinion on the identity of the various non-British specimens referred to *S. phillipsi* or *S. cuneata*.

1. *Foliage leaf*.—About forty specimens of *Sagenopteris phillipsi* were examined ; the best are figured, the remainder being less perfect leaves which show no features of special interest. With the exception of a few leaves of small size all have narrow lanceolate leaflets with a definite midrib. The veins are moderately conspicuous in some, indistinct in other specimens. A point of some interest is shown by the leaflet drawn in fig. 3 G ; the veins are traceable into the midrib, where they continue as distinct ridges for a considerable distance.

Fig. 3.



Sagenopteris phillipsi leaf.

A–F, H, portions of leaves natural size, G, as A, ×4; I as B, ×4. A, V.26429. B, V.23935. C, V.24716. D, V.24673. E, V.26427. F, V.26427. H, V.26428.

It is possible that some of the fine veins in G and I have been missed.

Three small leaves (fig. 6 B, C, D) show a lamina imperfectly divided into leaflets, and might be classified as *S. phillipsi* var. *cuneata* (the original *cuneata* shows two short leaflets instead of four). Their cuticles are normal, however; there is thus no reason for regarding them as anything but an extreme form of this variable species, a conclusion in agreement with Seward (1900), who reduced *cuneata* from a separate species to a variety or, as it would now be termed, a "form." Thomas (1925), on the other hand, regarded *cuneata* as a distinct species belonging to *Caytonia*, while typical *S. phillipsi* belonged to *Gristhorpia*. It is interesting that a comparable specimen is known in *S. nilssoniana* (Harris, 1932, text-fig. 2 F), and it is likely enough that they may be found for yet other species. In any case it is clear that these rather small leaves are of more varied shape than the full-sized ones and more difficult to determine on their form alone.

The leaflet V.24677 (fig. 6 A) is the longest figured in this species, being longer than the one distinguished by Seward (1900) as "variety *major*." Its cuticle is normal.

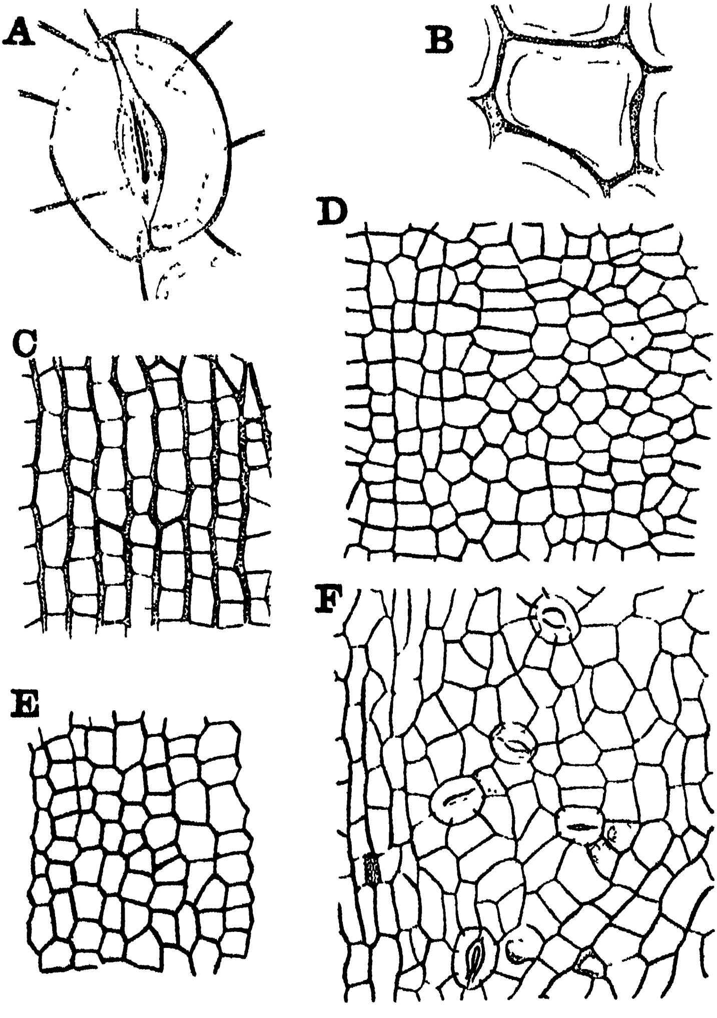
Surface sculpture.—The surface is either smooth or shows faint striations in the vein-interstices at right angles to the veins. It is thus smoother than some specimens at least of *S. colpodes*. The leaf appears to be glabrous.

Cuticle.—The cuticle is of moderate thickness or rather thin; the upper side measured 3 μ, the under 1·5 μ in a microtomed specimen.

The upper shows almost uniform straight-sided polygonal cells with strongly marked outlines. The cells along the veins only differ in being placed in obscure longitudinal rows. The surface of the cells is sculptured and appears obscurely mottled, this being only conspicuous in a water mount, and in certain specimens a more or less clearly-marked border can be traced round the cell.

The lower shows polygonal cells and stomates in the vein meshes, more or less rectangular and elongated cells along the veins. The cell outlines are very distinctly marked by a fine but prominent ridge; the surface is obscurely sculptured.

Fig. 4.



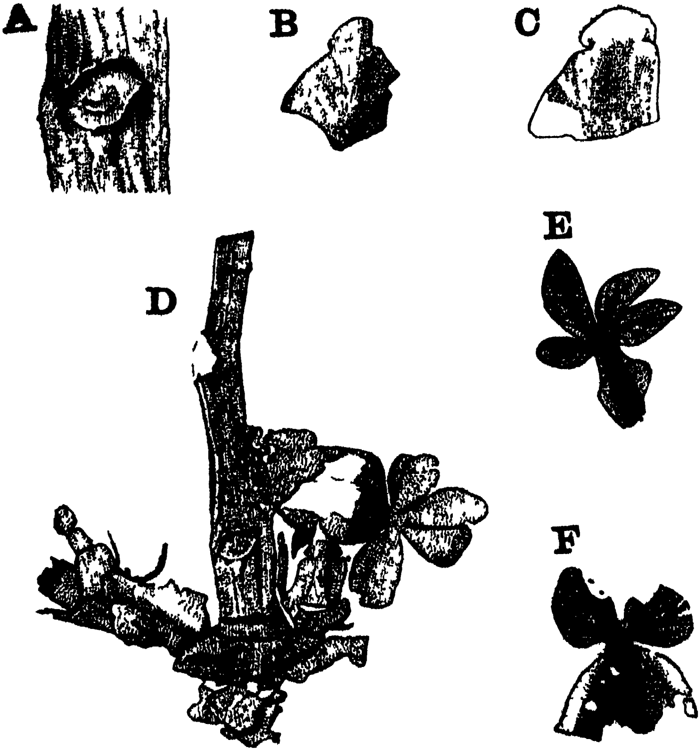
Sagenopteris phillipsi, **cuticle of foliage leaf.**

A, stomate from lamina, V.26430, × 800. B, cell of upper epidermis, V.26430, × 800. C, petiole, thick side, V.26427 *a* (from the specimen shown in 3 F), × 200. D, upper epidermis of lamina, V.26430, × 200. E, petiole, thin side, V.26427 *a*, × 200. F, lower epidermis of lamina, V.26430, × 200.

Occasional cells are thickened and have a bulging surface, but no hairs occur.

The stomates have no definite orientation. They show an oval outline, and the guard-cell surface takes up

Fig. 5.



Sagenopteris phillipsi, stem, small-leaf, and bud-scale.

A, leaf scar of stem shown in D, V.26427, × 8. B, bud-scale (shown to the left of D under different lighting), V.26427, × 8. C, bud-scale (shown to the right of D), stippled part detached and viewed by transmitted light, V.26427 *b*, × 8. D, shoot with small leaf and bud-scales, drawn immersed in paraffin, V.26427, × 4. E, small leaf (by transmitted light, transfer preparation), V.25872, × 4. F, small leaf, transfer by transmitted light, V.25878, × 4.

safranine or other stain. The surface of the guard cells shows a very distinct ridge near the aperture, which is thought to represent a wide "vorhof," and a delicate cuticle extends inwards through the aperture.

The cells next the stomate are as a rule unspecialized, but in some stomates one or more cells are thickened to form papillæ which point upwards or else overhang the guard-cell margin. Occasionally also the cell has divided to cut off an unspecialized "encircling cell" from a thickened "subsidiary cell."

A peculiar feature is that the cutinized walls of the surrounding epidermal cells extend inwards under the guard cells; this inward extension is developed more strongly in some specimens than others, some merely showing a slight extension of the wall where two subsidiary cells meet, others showing the whole extent of the anticlinal walls where they underlie the guard cells.

1. *Mesophyll.*—Certain leaves yielded a good deal of resistant internal matter on maceration, but this tends to be granular and did not indicate such definite cells as are seen in *S. colpodes.* The cells under the upper cuticle (palisade) appear to be rounded and 20 μ wide; no other layer was detected.

2. *Petiole.*—The cuticle of the petiole shown in fig. 3 F is thicker on one side than the other and shows straight-sided cells in rows; it differs from the specimen figured by Thomas in that the cells are of similar length on the two sides. No hairs were detected.

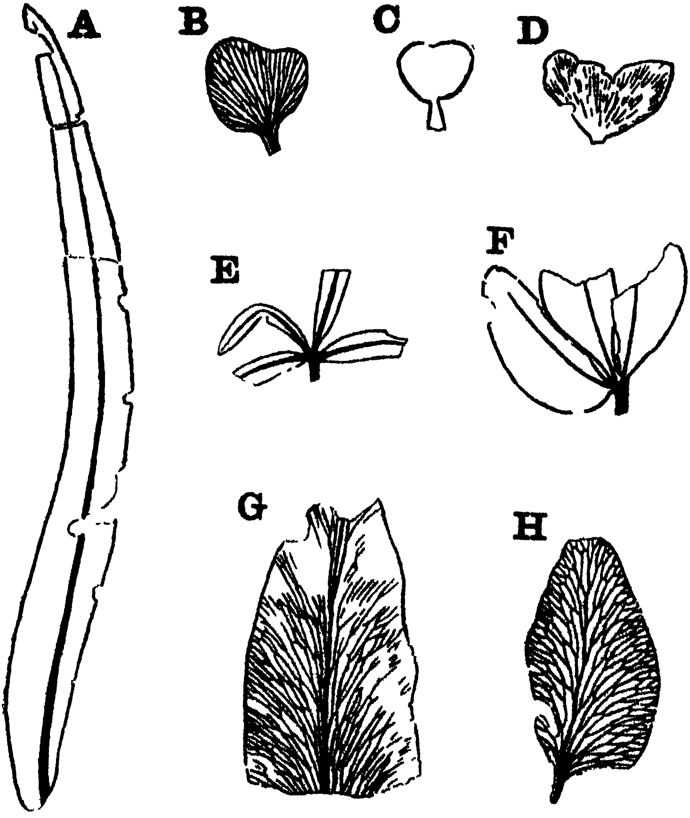
3. *Small leaves.*—Three specimens of bract-like leaves were studied, two isolated, one apparently still attached (fig. 5 D). They agree in having an expanded base, no distinct petiole, and leaflets with unusually crowded veins. The cuticle (of the basal part) shows the usual straight-sided cells.

Leaves of this sort have been known for a long time; Halle figured a fine series for *S. undulata.* The variation in shape of the lamina is noteworthy; it is evidently impossible to distinguish species by the shape of the lamina in these small leaves. The nature of these leaves appears to be an organ formed near the base of a shoot between the bud-scales and foliage leaves. There is no justification for calling them "young" leaves as several other authors have done.

4. *Bud-scales.*—Numerous scales are attached to the shoot (fig. 5 D); two were fairly complete and one was ultimately detached. The bud-scales are oval, 2–3 mm. long with a broad base. They form a concave scale

bearing at the apex a minute appendage (*cf.* lamina) with a scarious margin. The substance is thick and the vascular tissue was not made out; the cuticle of the scale is thick and shows very strongly marked outlines of straight-sided, squarish cells. The cuticle of the apical appendage is thinner; its margin is an extension for

Fig. 6.



A–E, extreme forms of *S. phillipsi*; F–H, normal specimens of *S. colpodes*, all × 1.

A, longest leaflet known, V.24677. B, undivided leaf, V.25853. C, undivided leaf, V.26460. D, partly divided leaf (*cuneata* form), V.21401. E, small leaf, V.24676. F, *S. colpodes* leaf, one leaflet probably missing, V.21886. G, *S. colpodes* holotype, V.26441. H, V.26440.

60 μ of a single layer of cells, partly continuous, partly broken into hair-like portions.

The bud-scale had not hitherto been recognized.

5. *Stem.*—The only specimen (fig. 5 D) is a moderately well-preserved shoot bearing at its base one (or two ?) side shoots largely concealed by scales. The main shoot shows a conspicuous leaf scar and probably four others which are borne spirally; it is in apparent continuity with a small leaf identified as *S. phillipsi* by its form and cuticle.

The surface of the stem is marked by more or less conspicuous longitudinal ridges, some of which start from the leaf scars. The best leaf scar is oval, with raised margins and a conspicuous C-shaped print representing a vascular strand; another near the base is broader and less high.

Careful attention was given to the question of the attachment of the *Sagenopteris* leaf. At certain points no break at all in tissue could be seen; above this there is a small gap, below overlap by the leaf base. Probably this could have been shown by making a transfer preparation, but the specimen was not risked because it is unique and not my own.

Comparison of S. colpodes, S. phillipsi, *and other Species.*

The leaf form is variable in all species and there is great overlap between them, though probably *S. phillipsi* is usually to be distinguished by its narrow and *S. colpodes* by its broad leaflets. *S. undulata* of the Rhaetic (Halle, 1910) is alone well distinguished by its dentate margin.

The cuticles provide a valuable and perhaps the only safe specific criterion. *S. colpodes* is unique in having sinuous cell-walls in all parts of its leaves and petiole.

S. phillipsi has a cuticle like those of *S. undulata* and *S. nilssoniana* (Lower Lias, see Harris, 1932), but slight differences exist; *S. undulata* has rather less straight-walled cells; *S. nilssoniana* (Lower Lias) has a thinner cuticle with very obscure, instead of conspicuous cell outlines.

S. hallei (Lower Lias, see Harris, 1932) is distinguished by the presence of a papilla in the cells of the lower side.

Slight differences in hairiness exist. *S. phillipsi* is almost perfectly glabrous; *S. colpodes* has minute hairs, especially on the petiole; *S. nilssoniana* has better developed hairs on the petiole. Differences of degree exist in the mesophyll and surface sculpture, but are only seen where the preservation is particularly suitable.

GENERAL DISCUSSION.

It is noteworthy that the cuticle has made possible the division of this *Sagenopteris* material into two sharply defined groups while no macroscopic character would serve. The clearing up of these two species is likely to assist in advancing our knowledge of the reproductive organs.

Two new points have come from the study of the lamina. In *S. phillipsi* the stomate is interesting in that the guard cells overlap the deeper parts of the surrounding epidermal cells, as they do in many angiosperms, e. g., *Helleborus*, and are evidently quite different in shape from the prevailing Gymnosperm type. The other is that the mesophyll is sometimes preserved (especially in *S. colpodes*), where it appears probable that a transfusion mesophyll occurs, comparable to that of various leaves with widely spread veins (Conifers, Cycads, some Monocotyledons, but not in typical Dicotyledons).

The discovery of the stem and bud-scale is of interest and should be of value in identifying future specimens of stems, from which one may hope to learn how the sporophylls were borne.

I wish to thank Mr. W. N. Edwards and Mr. F. M. Wonnacott for their help in the preparation of this paper, and I am indebted to the Trustees of the British Museum for permission to study the material.

SUMMARY.

1. A series of *Sagenopteris* leaves from the Oolite of Yorkshire is described.

2. They are shown to consist of two species, *S. phillipsi* (Brongn.) with straight walled, and *S. colpodes*, sp. n., with sinuous epidermal cells. *S. phillipsi* (Brongn.) includes *S. cuneata* (L. & H.).

3. Small foliage leaves and scale leaves of each are described.

4. A small stem of *S. phillipsi* is described.

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XXII.—*The North American Genera of The Dipterous Subfamily* Chamæmyiinæ. By JOHN R. MALLOCH.

THIS group has usually been given either family status as Ochthiphilidæ or considered as a subfamily of Agromyzidæ. I place it as a subfamily of Sciomyzidæ along with several others, including the Sapromyzinæ.

In 1921 I published a key to the genera, which Curran reproduced with some curtailment and an alteration of sequence in his book on North American Diptera in 1934. In the latter paper Curran has produced a peculiar situation by erecting a new genus for the reception of a species that has not yet been described, and herein I take the opportunity to remedy the matter.

Below I present a key which appears to be called for because of the failure to include in previous such keys an Australian genus that was introduced into California many years ago in connection with economic work on citrus insects. Whether this species became established or not I am unable to say.

Paratype specimens of two new species of *Plunomia* are in the British Museum.

Key to the Genera.

1. Frontal orbits each with one or more well developed bristles .... 2.
Frontal orbits without bristles proximad of the verticals .... 6.
2. Head very noticeably produced forward at base of antenna in profile, the face almost horizontal; wings dark spotted.......... *Acrometopia* Schiner.
Head not very noticeably produced forward at base of antenna in profile, the face shorter and almost vertical; wings not spotted .... 3.
3. Thoracic dorsum with four pairs of well developed dorsocentrals; ocellar bristles present or absent; mesopleura bare .... *Plunomia* Curran.
Thoracic dorsum with two or three pairs of dorsocentrals; ocellar bristles present ... 4.
4. Thoracic dorsum with three pairs of dorsocentrals .... *Chamæmyia* Panzer.
Thoracic dorsum with two pairs of dorsocentrals .... 5.
5. Mesopleura with a strong hind marginal bristle .... *Pseudodinia* Coquillett.
Mesopleura without a hind marginal bristle. *Pseudoleucopis* Malloch.
6. Arista lacking .... *Cryptochætum* Rondani.
Aristæ present, normal .... 7.
7. Costal vein with minute black spinules below; glossy blue-black species .... *Paraleucopis* Malloch.
Costal vein not spinulose below; densely grey-dusted species .... *Leucopis* Meigen.

PSEUDOLEUCOPIS Malloch.

Pseudoleucopis benifica Malloch.

A number of specimens of this species in the National Museum collection were reared by Koebele from *Eriococcus* sp., which is the same as the host from which the type-material was obtained in Australia.

It is possible that this species was never successfully introduced in this country, so that confirmation of the existence of the genus in North America is essential.

CHAMÆMYIA Panzer.

Chamæmyia polystigma Meigen.

This species is commonly met with throughout the North American continent, but the limits of the species are not well understood. I am of the opinion that there is a great amount of variation in the colour and markings and that it is entirely probable that instead of there being several species of the genus in this region there is but one. Our conception of *polystigma* is a form with partly yellow antennæ and the apices of the femora and all of the tibiæ and tarsi fulvous-yellow. The abdomen is entirely grey-dusted and has at least three pairs of black spots on the dorsum, one to each tergite, and at the lateral curve on each side of these tergites another black spot. This is the typical form met with in the more southern states of the Union. As we go farther north the general grey colour becomes darker, especially on the abdomen, and the legs become more extensively infuscated, while the number of black spots on the abdomen is reduced, the extreme forms having them lacking. It is remarkable that I have been unable to find in either the materials in my possession or in that in the United States National Museum collection a single male of the pale form here accepted as *polystigma*. I am accepting the following forms as possible subspecies :—

polystigma Meigen. Washington State; Aklavi, N.W.T.; Calgary, Alta. Generally distributed throughout the United States.

geniculata Zetterstedt. Like the above, but the tibiæ are broadly dark centrally and the palpi are fuscous.

Anchorage, Alaska (*Aldrich*).

juncorum Fallén. This form has the spots on the abdomen reduced in number, in all cases with none on the lateral curves of the tergites.

Medicine Hat, Alta. (*Malloch*); Aklavik, N.W.T. (*Bryant*); Calgary, Alta. (*Bryant*).

Chamæmyia fumicosta, sp. n.

A darker grey-dusted species than *polystigma*, with the antennæ dusky yellow, the third segment infuscated above, palpi yellow, the abdomen with three pairs of dorsal and extreme lateral marginal blackish spots, the coxæ and femora black, with grey dust, the remainder of legs fulvous-yellow. The dust on the lateral margins of the mesonotum and centre of pleura is yellowish. The most distinctive character of the species is the broad brown costal margin of the wing, this being narrowest at base, where it does not extend over the subcostal vein, becoming wider at apex of first vein where it extends to second vein, and from there widening to apex where it extends well over the second vein; the veins all thick and the outer cross-vein slightly browned. Halteres yellow.

In structure very similar to the genotype, all the bristles well developed, the postvertical pair not over half as long as the ocellar pair; the prescutellar pair of acrostichals small but distinct. Ocellar bristles in line with the anterior ocellus; lower margin of the gena with a series of rather well developed bristles. Inner cross-vein very slightly beyond middle of the discal cell; penultimate section of fourth vein fully two-thirds as long as ultimate.

Length 4 mm.

Type: White Mts., Arizona (*Parker*).

PSEUDODINIA Coquillett.

Key to the Species.

1. Ocellar bristles minute; each orbit with two minute fine bristles, the anterior one very poorly developed and far above the middle of frons, in the male shorter than the numerous erect bristly hairs on anterior third of the orbits, the posterior bristle not appreciably proximad of the anterior ocellus; frons anterior to anterior ocellus longer than wide; third antennal segment rounded at apex; frons and mesonotum glossy black, undusted; tibiæ and tarsi entirely fulvous-yellow .... *polita* Malloch.

Ocellar bristles well developed and rather long; orbital bristles moderately long, anterior one at or close to middle of frons, the posterior one distinctly proximad of the anterior ocellus; other characters not as above, the tibiæ always partly infuscated .... 2.

2. Frons largely or entirely grey-dusted, the thorax entirely so; antennæ partly fulvous-yellow or reddish yellow; anterior orbital bristle distinctly over half as long as the posterior one .... *antennalis*, sp. n.

Frons entirely glossy black; antennæ entirely black; anterior orbital bristle not over half as long as the posterior one .... 3.

3. Mesonotum glossy black, slightly grey-dusted on the lateral margins and humeri	*nitida* Melander.
Mesonotum rather evenly and distinctly dusted on the entire surface	*varipes* Coquillett.

It must be noted that I do not give locality records for the included species, except for the north-western states and the Canadian North-west, unless the species are new.

Pseudodinia nitida Melander.

Medicine Hat, Alta. (*Malloch*); Viola, Ida. (*Aldrich*). Originally described from Idaho.

Pseudodinia varipes Coquillett (=*pruinosa* Melander).

I have compared specimens of *pruinosa* with the type-material of *varipes* and can find no distinctions of consequence present.

Hollister, Ida., and Treesbank, Man. Originally described from New Mexico by Coquillett and from Texas by Melander.

Pseudodinia antennalis, sp. n.

Similar to *varipes* in general colour and in the entirely grey-dusted thorax and partly dusted abdominal dorsum, but the frons is much duller and has in the best-preserved specimens a fine grey dust over the entire surface. The ocellar bristles are stronger in this species than in any of the others, and so also are the anterior orbitals. The antennæ are rather variable in colour, sometimes dull fulvous-yellow and at other times with the third segment largely infuscated apically. There are no constant distinctive features in the wing venation that can be utilized for specific identification.

Length 2 mm.

Type, male, allotype, and one paratype: Chain Bridge, Va., Sept. 10, 1922 (*Malloch*). Paratypes: Glen Echo, Md., Aug. 6, 1922; Chesapeake Beach, Md., Aug. 18, 1922 (*Malloch*); Aweme, Man., Aug. 7, 1916 (*N. Criddle*); Treesbank, Man., Aug. 27, 1915 (*N. Criddle*); Knoxville, Tenn., Aug. 28, 1916; Tucson, Ariz., June 17, 1917: Salt Lake, Utah, July 18–20, 1917 (*Aldrich*).

Pseudodinia polita Malloch.

Known from only Illinois and Maryland.

PLUNOMIA Curran.

In my paper already referred to * I erred in identifying as *Chamæmyia elegans* Panzer a species in which the mesonotum has four pairs of strong dorsocentral bristles. Later Hendel pointed out this error, but he did not propose a new genus for the misidentified species, though he did say that it required one for its reception. In his book on North American Diptera Curran proposed the above new generic name for this purpose †.

I am acquainted at present with four American species of the genus. One or other of these (possibly the first one) may be identical with the one figured by me in 1921 and designated by Curran as genotype of *Plunomia*, but this cannot be determined without a re-examination of the specimens.

Key to the Species.

1. Frons with a pair of long strong ocellar bristles that are situated either on each side of or slightly in front of the anterior ocellus .... 2.
   Frons with at most minute ocellar hairs, visible only under a high magnification (× 32) ...... 3.
2. Ocellar bristles proximad of the anterior ocellus; antennæ partly yellow; only the apical three segments of the hind tarsi black; male hypopygium with the superior forceps produced into a long acute point .... *transversa*, sp. n.
   Ocellar bristles in transverse line with the centre of anterior ocellus; antennæ black, apical four segments of hind tarsi black; male hypopygium with the superior forceps blunt at apex ..... *obtusa*, sp. n.
3. Antennæ and hind tibiæ largely blackened; apical three segments of hind tarsi blackened.. *tibialis*, sp. n.
   Antennæ and hind tibiæ entirely yellow; only the apical one or two segments of the hind tarsi blackened.............................. *flavicornis*, sp. n.

Plunomia transversa, sp. n.

This and all other three species of the genus are very similar to *C. polystigma* in colour, being black, densely pale grey-dusted, the mesonotum without dark vittæ, and the abdomen with paired black markings on each tergite; the legs are mainly yellow, with the femora largely, the centre of the tibiæ sometimes, and the apices of the tarsi always, infuscated. There is one constant distinction in the markings on the abdomen. In the present genus the black marks consist of a transverse basal band that is narrowly broken in the centre, ceases at the lateral curve in the males, and is carried downward on to the ventral surface in the females. In the other genus the tergites have, when distinctly marked, paired small rounded spots either on the disc or on the disc and at the lateral curves of two or more of the tergites. The other and distinguishing characters are given in the above key, so that fuller descriptions appear unnecessary.

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* Bull. Ill. State Nat. Hist. Surv. vol. xiii. art. 14, p. 347 (1921).

† 'North American Diptera,' p. 365 (1934).

Type, male, allotype, and one paratype: Chain Bridge, Va., Sept. 10, 1922 (*Malloch*). Paratypes: Washington, D.C., New Ulm, Minn., Canton, S.D., Hazelton, Pa., Loveland, Colo., Midland and Allegan, Mich., and Fairbanks, Alaska.

A very widely distributed and evidently common species, as I have seen many specimens that are not at present available for listing. This apparently is the species erroneously called *elegans* by various North American writers.

Plunomia obtusa, sp. n.

A rather smaller (1·5 mm.) and darker coloured species than the genotype, and readily distinguished from it by the characters of the male hypopygium and other features listed in the foregoing key.

Type: Fairbanks, Alaska, July 3, 1921; allotype and 2 paratypes: Healy, Alaska, June 27, 1921 (*Aldrich*).

Plunomia tibialis, sp. n.

The lack of the long pair of ocellar bristles in this and the next species may yet be used as a subgeneric character by another worker, but I do not believe that there is anything to be gained by the adoption of such a course. The species is in all particulars similar to *obtusa*, except as stated in the key and in having the antennæ partly yellow.

Length 2 mm.

Type, female, and 2 female paratypes: Michigan City, Ind., June 19, 1915. One paratype: Lafayette, Ind., May 15, 1918 (*Aldrich*). One paratype: Waubamic, Ont., July 15, 1915, and one, Somerset Junct., Mich., May 30, 1936 (*C. W. Sabrosky*).

Plunomia flavicornis, sp. n.

This species is paler than *tibialis* and has the head quite markedly produced in front, almost as in *Acrometopia*, but the antennæ are much shorter and the wings are hyaline, without dark spots.

Length 2·5–3·5 mm.

Type, male, and 2 male paratypes: Treesbank, Man., July 20, 1915 (*N. Criddle*). Allotype: Waubamic, Ont., July 15, 1915 (*N. Criddle*). Paratypes: Michigan City, Ind., June 29, 1915; Lafayette, Ind., July 12, 1918; New Ulm, Minn., May 30, 1916; Reynolds, Ind., July 11 (*Aldrich*), and 13 miles north of Zaper, Mich., May 30, 1937 (*C. W. Sabrosky*).

LEUCOPIS Meigen.

In 1921, in the paper already referred to herein, I divided this genus into three subgenera on the basis of the different bristling of the head and thorax in the segregates. This course has been followed by several European workers since that time. In the collection before me now there are three new species, and I offer a note on one already described by me.

Leucopis americana Malloch.

This may be the species recorded under the name *griseola* Fallén by Melander from Idaho and Washington State. In any event *griseola* has a strong pair of prescutellar acrostichal bristles and belongs to a different subgenus. The specimens before me now agree with the description of *americana* and lack the prescutellar acrostichal bristles.

Moscow, and Viola, Ida., Clarkston, Wash., and Alaska (*Aldrich*).

Leucopis ocellaris, sp. n.

This species differs from any in the subgenus *Leucopina* in having a distinct though short pair of backwardly curved bristles, one on each side of the anterior ocellus. In general it closely resembles *bella* Loew, but the mesonotum has a pair of dark grey submedian and a broader pair of brown sublateral vittæ. The abdomen has the first visible tergite fuscous, the second to fourth each with a blackish central basal spot, and the second with an additional pair of black discal spots. The tarsi are fulvous-yellow, with only the apical one or two segments infuscated.

The frons is considerably wider in front than at the vertex, the orbits are distinct though not unusually wide, and the ocelli are widely separated, the hind pair being more distant from each other than either is from the anterior one. The third antennal segment is distinctly higher than long and larger than usual.

Length 2·75 mm.

Type, female: Medicine Hat, Alta., 1930 (*F. S. Carr*). One paratype, in which the fore tarsi are a little more extensively infuscated and the antennæ slightly smaller, from Aweme, Man., July 26, 1916 (*N. Criddle*).

Leucopis bivittata, sp. n.

Similar to the next preceding species, but with two very distinct dark brown complete mesonotal vittæ that converge behind, and no evident submedian grey vittæ. The black abdominal spots are larger and the tarsi more extensively blackened, only the basal segment or that and part of the second being yellow.

Length 2 mm.

Type, female: Alhambra, Cal., Aug. 15–30, 1916, predator on *Pseudococcus* (*J. R. Horton*).

Leucopis verticalis, sp. n.

A small dark grey-dusted species, with the same general markings as the two next preceding species, but the abdomen has the three spots on the second visible tergite large, extending the entire length of the tergite, and dark brown, the other central spots smaller. The striking feature of the species is to be found in the large, raised, and densely felted ocellar triangle that extends about midway to the lunule, has the anterior ocellus near its anterior extremity and each of the posterior ocelli on its outer posterior angles not farther from the eye than the width of an ocellus. The other characters are normal, and the leg colouring is as in *bivittata*.

Length 3 mm.

Type, male: Martinez, Cal., July 11, 1917 (*Aldrich*).

Leucopis bella Loew.

Fairbanks, Alaska, and Viola, Ida.

Leucopis minor Malloch.

One specimen apparently of this species, South Harbour, Wash.

Leucopis simplex Loew.

Melander recorded this species from Washington, but I have not seen any specimens from that state.

CRYPTOCHÆTUM Rondani.

There is but one North American species of this genus, the introduced *iceryæ* Williston, brought in to control the mealy citrus-bug in California.

PARALEUCOPIS Malloch.

Another monobasic genus. The genotype, *corvina* Malloch, does not occur in the north-west.

ACROMETOPIA Schiner.

The only North American species of this genus, *punctata* Coquillett, occurs in Georgia.

XXIII.—*Neue Malacodermata aus der Sammlung des British Museum.*—9. *Beitrag zur Kenntnis der indo-malayischen Malacodermata.* Von W. WITTMER, Zürich.

Drilidæ.

Pachytarsus bryanti, sp. n.

♂. Gelb bis gelborange, Fühler vom 3. Gliede an, Augen, apikale Hälfte der Flügeldecken, Tibien mit Ausnahme der äussersten Spitze und Tarsen (letztere mehr oder weniger) dunkelbraun bis schwarz.

Kopf mit den Augen schmäler als der Halsschild, grob punktiert, zwei seichte Furchen ziehen sich von der Mitte der Stirne schräg bis jederseits gegen den Vorderrand der Augen ob der Fühlerwurzeln. Fühler ziemlich lang, vom 3. Gliede an grob gezahnt, die mittleren Glieder etwas breiter als lang, die Spitzenglieder länger als breit. Halsschild gut um die Hälfte breiter als lang, Vorderecken

vollständig verrundet, etwas herabgedrückt, Seiten kurz vor der Basis leicht verengt, Mittelfurche deutlich, Punktierung dicht und tief. Flügeldecken mit Spuren von 3 Längsrippen, Punktierung runzlig. Die schwarze Färbung auf der hinteren Hälfte der Decken steigt an der Naht und Seiten jederseits noch eine Strecke herauf.

Länge : 5·5 mm.

CEYLON : Kandy, vii. 1908 (*G. E. Bryant*).

Durch die helle Färbung von Kopf und Halsschild von den übrigen Arten gut zu unterscheiden, die Art ist ihrem Entdecker gewidmet.

Cantharidæ.

Læmoglyptus nigricollis, sp. n.

♂. Schwarz, nur die basale Hälfte der Flügeldecken, die Naht und der Saum bis knapp zur Spitze der Decken, ohne die Spitzen zu umfassen, gelb.

Kopf mit den Augen so breit wie der Halsschild, Augen gross, stark hervorstehend, Durchmesser eines Augen so gross wie ihr Abstand. Fühler vom 3. Gliede an in lange Fortsätze erweitert (flabelliert). Halsschild kurz und breit, Vorderecken mit dem Vorderrand vollständig verrundet, Seiten kurz vor der Basis abgesetzt und mit einem tiefen, runden Einschnitte versehen, der an seinem Innenrande mit einem scharfen Zahne bewehrt ist. Basalecken in scharfer Spitze hervorstehend. Flügeldecken fast 4 mal so lang wie an den Schultern breit, Basis wenig deutlich sichtbar punktiert, gegen die Spitzen zunehmende runzlige Punktierung.

Länge 5–5·2 mm.

JAVA : Soekaboemi, 2. iv. 1909 (*G. E. Bryant*).

Nahe verwandt mit *L. javanus* Pic, von dieser Art verschieden durch die Form des 3. Fühlergliedes, das weniger breit ist, die Basalecken des Halsschildes, die etwas länger ausgezogen und stärker zugespitzt sind und die ausgedehntere, dunkle Färbung der Flügeldecken.

Inmalthodes flavus, sp. n.

♂. Gelb, nur die Spitzen der Fühler vom 4. oder 5. Gliede an, die Augen und die häutigen Flügel, dunkel. Aeusserste Spitze des letzten Fühlergliedes manchmal leicht aufgehellt.

Kopf mit den Augen ungefähr so breit wie der Halsschild, glatt, Stirne leicht gewölbt. Fühler ungefähr so langwie der ganze Körper, leicht flachgedrückt, 2. Glied eine Spur kürzer als das 3.; 4. nur wenig länger als das 3.; 4. bis 8. unter sich gleich lang; 9. und 10. wieder etwas kürzer, so lang wie das 3. Halsschild kurz und breit, alle Ränder leicht erhaben, Seiten in der Mitte ein wenig eingedrückt, Vorderecken verdickt, vorstehend. Flügeldecken etwas mehr als doppelt so lang wie an den Schultern breit, leicht verkürzt, die hautigen Flügel nicht ganz deckend, leicht klaffend, jede Decke an der Spitze einzeln abgerundet, Punktierung äusserst dicht, grob, narbenartig, Seitenrand, Spitzen und Nahtrand mit einer Reihe tieferer Punkte besetzt.

Länge: 2 mm.

Borneo: W. Sarawak, Mt. Matang, 7. xii. 1913 (*G. E. Bryan*).

Von der einzigen bisher bekannten Art, *I. luteomaculatus* Pic, durch die helle Färbung, die stärker und tiefer punktierten Flügeldecken verschieden, die bei der neuen Art leicht verkürzt sind und die häutigen Flügel etwas hervortreten lassen, bei *luteomaculatus* Pic bedecken sie die Flügel vollständig.

Falsomalthodes marshalli, sp. n.

♂. Gelb, nur die Augen, eine verschwommene Makel in der Mitte auf den Flügeldecken und die häutigen Flügel dunkel.

Kopf so breit wie der Halsschild, leicht gewölbt. Fühler nicht ganz so lang wie der Körper, 2. Glied ungefähr so lang wie das 3., dünner als dieses; 4. bis 10. allmählich kürzer werdend, perlschnurförmig aneinandergereiht, jedes Glied in der Mitte am dicksten und jederseits leicht gerundet-verengt; 11. schmäler als die vorangehenden, fast so lang wie das 9. und 10. zusammengenommen. Halsschild breiter als lang, Seiten fast parallel, Vorderecken nur wenig stark abgesetzt, Scheibe glatt. Flügeldecken verkürzt, ca. doppelt so lang wie breit, klaffend, fast glatt, gegen die Spitze etwas runzlig gewirkt, verdickter Spitzenteil ebenfalls glatt. Hinterschienen kurz vor dem Tarsenansatz spatelförmig erweitert, in eine schwache Spitze ausgezogen.

Länge: 2 mm.

Borneo: W. Sarawak, Mt. Matang, 7. xii. 1913 (*G. E. Bryant*).

Die Auszeichnung an den Hinterschienen ist für diese Art charakteristisch, dank diesem Merkmale lässt sie sich mit keiner der bisher bekanntgewordenen Arten verwechseln. Die Bildung erinnert an die analoge bei verschiedenen *Malthinus*-Arten.

Die Art ist Sir Guy A. K. Marshall, Direktor des Imperial Institute of Entomology, London, gewidmet.

XXIV.—*Some Notes on the Biology of the Copepod* Diaptomus castor.

By Robert Gurney.

The following notes on the growth under natural conditions of the Copepod *Diaptomus castor* are due to the chance of a visit in January 1931 to a small pond at Cothill, near Oxford, very soon after it had been filled by the winter rains. This pond occupies a hollow at the corner of a pasture, and is normally dry throughout the summer and autumn. When full, as on this occasion, it consists of an area of a few square yards of clear water about a foot deep and a larger area of shallower water through which the pasture-grass protrudes. It is only in the small area of clear water that collections were made. As it was observed that the population of *D. castor* had only hatched out within a few days, and consisted almost entirely of copepodid stages 2 and 3, it seemed a good opportunity to follow the progress of the colony. Samples were taken at intervals of a few days, and a proportion of the catch analyzed and measured. On the last two visits the numbers were so few that it was useless to continue observation. A visit was paid on May 10, when a few adults were still to be found, but no young. It seems probable that, owing to the very small area of the pool, I had actually fished out the greater part of the population.

Table I. shows clearly that on each visit the whole population had progressed from stage to stage, and that it was not being augmented to any appreciable extent by further hatching of resting eggs—in fact, not a single nauplius was seen throughout. This is a little surprising as, although it is natural to expect all eggs on the surface to hatch at the same time, one would expect others a little more deeply buried to hatch later. If all eggs hatch as soon as a pond fills up, a drought before the colony had reached the stage of reproduction would wipe it out altogether. Perhaps there is some factor which preserves dormant those eggs which are not at the beginning exposed to influences favourable for hatching.

It had been my intention to repeat these observations on another occasion, but the years have gone by and the same conditions have not been repeated, so that I now offer the facts, incomplete as they are, as a small contribution to the biology of a common Copepod of the type characteristic of temporary pools.

1. *Proportion of the Sexes.*

An interesting and rather unexpected fact emerges very clearly, namely, that development of the males lags markedly behind that of the females. The sex can first be determined in stage 4. Individuals in this stage were first found on January 12 in very small numbers, but on January 17 they formed 37 per cent. of the population. Every one examined then was female. On January 22, on the other hand, males were nearly as numerous as females (45 per cent.), and more numerous (56 per cent.) on January 26. On February 1, when stage 4 was disappearing and represented only 7·47 per cent. of the population, males were still more in excess (66 per cent.). It was only in the last two samples that difficulty was found in determining the sex of some individuals, and these I am inclined to regard as females. These were probably abnormalities in what one might call the dregs of the female population. It would have been interesting to follow the fate of such individuals, but their existence was not discovered until the opportunity had passed. It would seem that there is a point at which most of the normal females have passed on to stage 5, leaving only those which are weak or in some way abnormal.

This selective moulting of the sexes somewhat hampers study of the growth-rate. When one is able to follow a colony from start to finish at sufficiently short intervals the error in sampling due to the passing out of a greater or less proportion of one sex from one stage to another probably adjusts itself, but in this case when the colony was first examined a considerable proportion of stage 2 (about 28 per cent.) had already moulted to stage 3. Assuming that the same thing happens in this stage as in stage 4, it is clear that most, if not all, of these will be female, and that the remaining sample of stage 2 is overweighted with males. Consequently the average size will be slightly too low. The error in this case is probably very small, but not negligible. That this selective moulting does exert an appreciable effect on the measurements is shown in the tables. Thus, whereas the average size on January 17 of stage 4 was 1·40 mm., when nearly all are supposed to have been female, during the next nine days it dropped through 1·38 to 1·35 mm. as the proportion of males rose. There was a rise to 1·42 mm. on February 1, when nearly all were males, but the sample measured was a very small one and, as subsequent investigation showed, not representative. The true average should have been about 1·35 mm.

Measurements of individuals of which the sex was known also show some evidence for selective moulting· Whereas on January 17 and 22 the average size of females was 1·44 mm. (on each occasion), on January 26 it had fallen to 1·35 mm., and the same figure was found on February 1. It may be that the remaining females included an unduly large proportion of weakly or backward individuals.

The measurements of males are less satisfactory. The average size on January 22 and January 26 was 1·31 mm., and it had increased to 1·36 mm. on February 1. No explanation of this rise can be offered, since by this time the more vigorous and mature specimens should have already passed on to stage 5, but the numbers dealt with were too small to give reliable results. At the end of the period individuals in stage 4 were so few that it was a laborious business to pick out enough to measure.

A short series of plankton samples taken in Ormesby Broad, Norfolk, during the year 1927–1928 show something of the life-history of *Diaptomus gracilis*, a species of open permanent waters. In November there were a few females and young but no males in the sample taken.

In February females were abundant and breeding, and very much in excess of the males. In March, April, and May males exceeded females, and a great decline in adults of this generation followed. The evidence is weak, but tends to show that females developed in advance of the males.

In *Cyclops vicinus*, in the same series of samples, males were greatly in excess of females from the first, and remained so throughout, a few being found after the disappearance of all females.

2. *Growth Factors.*

The growth factors calculated from the averages of all measurements do not show any differences between male and female, and the decline from stage to stage is not so marked as it has been shown to be in *Eurytemora velox* for example *.

It is unfortunate that it was not found possible to determine the sex of a sufficient number in stage 4, and the small sample measured on February 5 does not seem to have been fairly representative. It is probable that this sample was taken after the most vigorous specimens had moulted to stage 5, leaving the population in this stage below the real average. The growth factors given for stage 5, since the unsorted average for stage 4 was used in obtaining it, is too high for the female and too low for the male.

An attempt was made to check the growth factors by measurement of individuals moulting in the laboratory, but the results are unsatisfactory, partly by reason of the small numbers deal with and partly by the unreliability of the measurements. Measurement of length had to be made from living specimens uninjured by compression, and this is most difficult to do accurately. Measurements from the moulted skin are of doubtful value owing to possible stretching of the skin. For this reason segments of the legs and the terminal spine thereon were chosen as being less likely than other parts to such distortion. The furcal rami, which were also measured, are probably easily stretched, and so of little value.

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* Gurney, 1928, Int. Rev. Hydrob. Hydrog. xxi. p. 192.

TABLE I.—*Numbers measured and percentage of each stage.*

Stage.	Jan. 4.		Jan. 12.		Jan. 17.		Jan. 22.		Jan. 26.		Feb. 1.		Feb. 5.		Feb. 12.		Feb. 22.		May 10.	
	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.
I.	1	1	5	2																
II.	68	70	124	46	29	20·7	2	·9												
III.	27	28	108	40	56	40	38	17·9	..	..	1	·46								
IV. ...	..	..	33	12	52	37	96	45·3	52	27·5	16	7·47	23	8·4	1	2·5				
V., ♀	..	..	..	..	3	2·1	65	30·6	107	56·6	101	47·2	124	45·7	12	30	13	13		
V., ♂	..	..	..	.	..	..	10	4·7	21	11·1	40	18·7	48	17·7	5	12·5				
Adult ♀ .	..	..	..	..	..	..	1	·47	9	4·7	50	23·3	68	25·0	16	40	75	75	34	89
Adult ♂ .	..	..	..	..	..	..	..	..	.	..	6	2·8	8	2·9	6	15	12	12	4	10
Total number	96		270		140		212		189		214		271		40		100		38	

Table II.—*Average size in millimetres.*

Stage.	Jan. 4.	Jan. 12.	Jan. 17.	Jan. 22.	Jan. 26.	Feb. 1.	Feb. 5.		Feb. 12.	Feb. 22.
							Sample 1.	Sample 2.		
I.	..	·58								
II.	·82	·78	·81	·72						
III.	1·06	1·01	1·04	1·04	..	·95				
IV., ♀ ...	..	1·37	1·40	1·38	1·35	1.42	1·37	1·29		
IV., ♂ ...							1·22	1·25		
V., ♀	..	..	1·78	1·87	1·83	1·81	1·73	1·71	1·58	1·71
V., ♂	..	..	..	1·68	1·65	1·66	1·58	1·55	1·51	
Adult ♀ .	..	..	..	..	2·38	2·22	2 22	2·21	1·98	2·13
Adult ♂ .	..	..	..	..	..	2·15	1·97	1·98	1·90	1·95

Table II. a.—*Additional specimens of Stage IV.*

	Jan. 17.		Jan. 22.		Jan. 26.		Feb. 1.		Feb. 6.	
	Number.	Av. size.	Number.	Av. size.	Number.	Av. size.	Number.	Av. size.	Number.	Av. size.
♀	18	1·44	22	1·44	11	1·35	6	1·35	23	1·307
♂	..	..	10	1·31	14	1 308	12	1·36	14	1·22

So far as these measurements go they show very much less growth than was to be expected. Although each moult took place within twenty-four hours it is probable that isolation in unfavourable environment even in that time would seriously affect the growth, and the conclusion seems to be that such observations are useless unless it is possible to give the animals exactly the same conditions as those under which they were normally living.

A few individuals were kept through a succession of moults from stage 2 onwards, measurements of length only being taken; but the results, for the reasons given, are not worth recording.

TABLE III.—*Showing growth factors without distinction of sex in Stage IV. The numbers measured in Stage IV. of which the sex was ascertained were not sufficiently large to be used in calculating the growth factor to Stage V.*

Stage.	Number measured.	Average size.	Growth factor.
I.	5	·58	
II.	223	·78	1·34
III.	230	1·02	1·30
IV.	281	1·33	1·30
V., ♀	425	1·75	1·31
V., ♂	124	1·60	1·20
VI., ♀	253	2·19	1·19
VI., ♂	36	1·99	1·24

TABLE IV.—*Showing growth factor for certain parts at the moult from Stage V. to adult (Stage VI.).*

	♂. V.–VI.	♂. V.–VI.	♀. V.–VI.	♀. V.–VI.
Length	1·08	1·21	1·18	1·17
Ramus	..	1·21	1·03	1·08
Leg 4. RE 3	1·18	1·10	1·06	1·06
Leg 4. Spine	..	1·15	1·03	1·13
Leg 3. RE 3	1·07	1·18	1·12	1·14
Leg 3. Spine	..	1·06	1·03	1·15
Average of growth factors	1 11	1·15	1·07	1·12

XXV.—*New Papuan Fishes*. By Ethelwynn Trewavas, D.Sc., British Museum (Natural History).

Early in 1938 there was received at the British Museum (Natural History) a collection of Papuan fishes from Mr. J. C. Adamson, a member of the government party sent to open up a region in the upper part of the basin of the Kikori River. The fishes were all collected in Lake Kutubu, 3000 feet above sea-level. The lake drains by way of the Digimu River into the Kikori.

The fishes belong to three species, a *Therapon*, an Atherinid of the genus *Craterocephalus*, and an Eleotrid. The *Therapon* is new to science, and I have pleasure in naming it in honour of Mr. Adamson. The *Craterocephalus*, in the present state of our knowledge of the genus, is best given a new name. The Eleotrid also appears to be new, but I prefer not to describe it from the single specimen at present available.

Therapon adamsoni, sp. n.*

Depth of body 2½ to 3 in the length, length of head 2⅗ to 3. Dorsal profile of head nearly straight, or slightly concave above the eye and convex on the snout. Snout from as long as diameter of eye (young) to 1⅗ this length, 3⅕ to 3½ in length of head. Diameter of eye 3½ to 5⅔ in length of head, depth of preorbital 6 to 6⅔, interorbital width 3⅓ to 3⅘, length of lower jaw (angle to symphysis) about 2. Anterior nostril a little nearer to posterior than to oral edge of preorbital. Preorbital edge entire. Jaws equal anteriorly. Maxillary extending to vertical from anterior edge of eye. 7 to 9 series of scales on the cheek. Vertical edge of preoperculum serrate. Two opercular spines, the lower much longer, but not extending beyond opercular flap, rarely (one side of type) with a third small spine below it. Cleithrum † slightly denticulate above pectoral fin, or entire in older specimens, supracleithrum ‡ covered by scales. Outer teeth of jaws conical, fixed; inner small, forming a band of three or four series. No teeth on vomer or palatines. 9 to 11 short gill-rakers on lower part of anterior arch. Scales 52 to 56 in the lateral line (excluding 0 to 3 on caudal base), 9 or 10 between origin of dorsal and lateral line, 20 or 21 between this and pelvic, or about 23 to mid-ventral line. Dorsal XII 11–12; the 4th to 8th spines longest, from a little more to a little less than ¼ length of head, the 11th spine but little longer than the 12th. Anal III 9 (–10); second spine stronger and usually longer than third. Scaly sheaths of dorsal and anal fins only slightly developed. Caudal slightly emarginate. Caudal peduncle 1¼ to 1⅓ times as long as deep.

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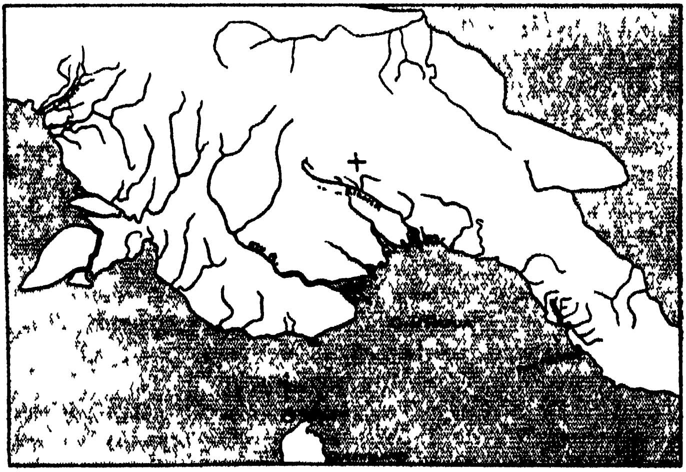
* By an amendment passed at the Padua Conference Article 19 of the International Rules of Zoological Nomenclature reads "The original orthography of a name is to be preserved unless an error of transcription (transliteration), a *lapsus calami*, or a typographical error is evident." This provides for the spelling of *Therapon* adopted here.

† and ‡. These are the bones usually referred to in descriptions of *Therapon* as coracoid and suprascapula.



Sketch-map of part of New Guinea, showing type-localities of species of *Craterocephalus*. The approximate position of L. Kutubu is marked by a +.

Young with 7 or 8 longitudinal dark stripes on each side, which become masked in older specimens by the general leaden colour, relieved by a lighter mark on each scale. Soft dorsal, anal, and caudal dark between the rays either in their proximal two-thirds or over their whole extent.

Seven specimens, 66+12 to 170+30 mm. long, from L. Kutubu, British New Guinea.

A specimen of 130+25 mm. is selected as the holotype. The depth is nearly 3 times, the head 2⅘ in the length. The eye is nearly 5 in the head, the snout 3⅓, the interorbital width 3½, preorbital depth 6. Lateral line 52. Dorsal XII 12. Anal III 9. The second anal spine is stronger, but not longer than the third. Faint traces of three of the longitudinal bands can be seen on the flank.

This species appears to be related to *T. habbemai* Weber (1910), of the Lorentz and Mimika Rivers, New Guinea, but differs in the more slender form, larger mouth, shorter spines, and weaker scaly sheaths for dorsal and anal fins.

Craterocephalus lacustris, sp. n.

Depth of body nearly 4 in the length, length of head 3⅗. Snout 3½ in length of head, 1¼ diameter of eye, which is 4½ in length of head. Interorbital region nearly flat, its width 2½ in length of head, depth of preorbital 6, length of lower jaw 2⅓. Mouth small; maxillary extending ⅔ distance from tip of snout to eye; lower jaw projecting. Two sparse series of small teeth in each jaw. A single series of scales on the cheek. 10 short rounded gill-rakers on lower part of anterior arch. 36 scales in longitudinal series along the dark lateral band, most of them with a pit or a groove for lateral line; 17 or 18 before dorsal, 7 between anal and second dorsal. Dorsals VIII and I 9; origin of first scarcely nearer to tip of snout than to caudal base, a little nearer to opercular margin than to origin of second. Anal I 9; origin slightly before that of second dorsal. Caudal emarginate. Caudal peduncle twice as long as deep, ⅔ length of head. A dusky band along the side, about ¾ as broad as a scale, its upper edge denser black; a dark spot on each scale of five longitudinal series—the series covering the lateral band, one above, and three below it; back greenish grey; fins clear.

Described from the type, 115+13 mm. long.

A young specimen, 38 mm. to base of caudal, from the mouth of a *Therapon*, probably belongs to this species. D VII—I 8. A I 8. (The first dorsal is damaged and may have included an eighth spine.) Diameter of eye a little more than 3 times in length of head, interorbital width 3¼, length of lower jaw 2⅓. Head 3⅗ in the length.

Length of caudal peduncle $\frac{4}{5}$ head. Origin of first dorsal nearer to operculum than to second dorsal.

Three species of *Craterocephalus* have been described from the southern rivers of New Guinea. *C. nouhuysi* (Weber), 1910 (Weber and de Beaufort, 1922, p. 277), from the Lorentz R., differs from *C. lacustris* chiefly in the coloration, having no series of spots on the scales, and in the non-projecting lower jaw. *C. annator* Whitley, 1938, from the Fly R., was described from smaller specimens than *C. nouhuysi*, and apart from juvenile characters seems to differ from it only in the shorter pectoral fin. Both appear to have a wider interorbital region than the L. Kutubu fish. *C. randi* Nichols and Raven, 1934, from the Kubuna R., "not far N.W. of Port Moresby," approaches the new species in coloration. The type was a fish of only 55 mm. standard length, and in both it and the paratypes all the fins have fewer rays than in *C. lacustris*. The dorsal fin is set farther back, the caudal peduncle is as long as the head, and the lower jaw does not project.

The Queensland species, *C. stercus muscarum* (Günther), 1867, has two series of spots above the lateral band as well as two or three below it. The types are respectively 34 and 43 mm. in standard length, and in comparison with the young specimen of *C. lacustris* have a shorter lower jaw ($2\frac{2}{3}$ times in length of head) and wider interorbital region ($2\frac{3}{4}$ to nearly 3 in length of head). They also have four series of teeth in the lower jaw, whereas only two can be distinguished in *C. lacustris*.

The three species *C. stercus-muscarum*, *C. randi*, and *C. lacustris* are evidently closely related, and it is most desirable that good series from each locality should be collected and compared.

XXVI.—*On* Gammarus (Pectenogammarus) planicrurus, *subgen. et sp. n.* (*Crustacea, Amphipoda*). By D. M. Reid, Department of Biology, Harrow School.

This amphipod, which is clearly a member of the family Gammaridæ, has so many unusual characteristics that it cannot be fitted into Schellenberg's (1937) scheme of classification. To establish a new genus for it seems to be a little unnecessary, since, so far, there is only one known species. It is therefore suggested that it be put into a new subgenus of *Gammarus* called, because of the comb-like arrangements of bristles on the side-plates and elsewhere, *Pectenogammarus*.

Since the bristles are much fewer in the female than in the male, they do not always provide a good distinguishing subgeneric characteristic. A better characteristic is the shortness and breadth of the limbs, which are not at all like those of other gammarids. It is not proposed to give a definition of the new subgenus here, since there is at present only one species, and the description of that will suffice.

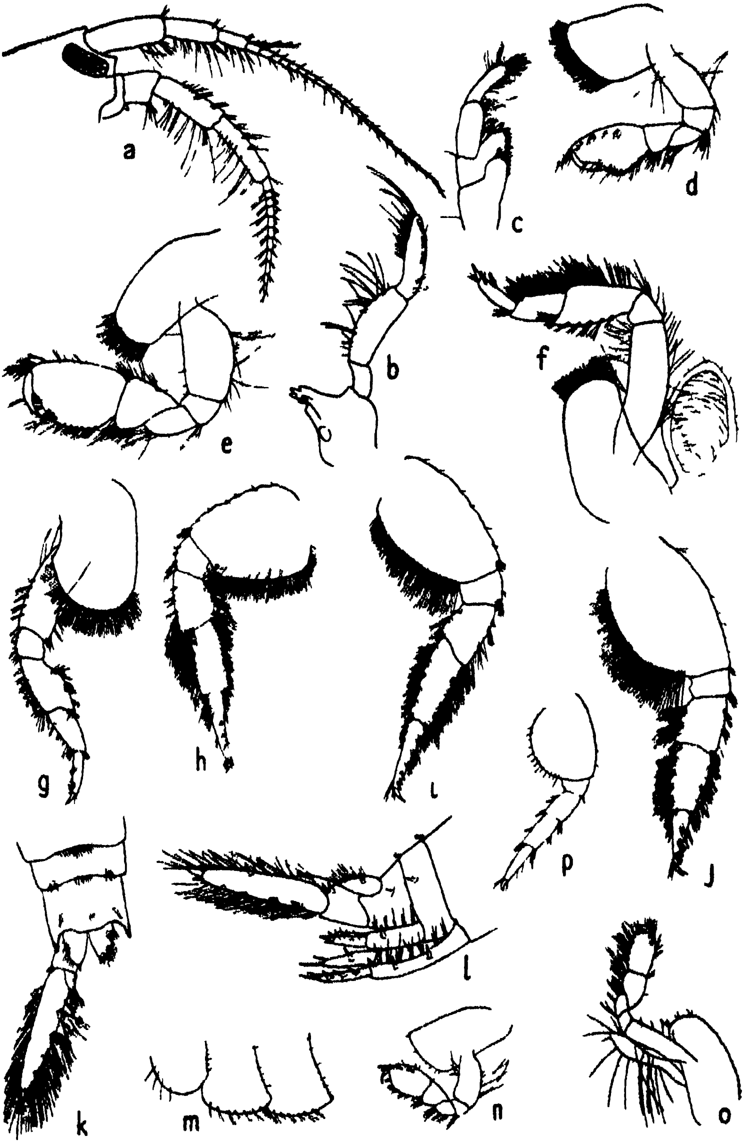
Occurrence.

This organism occurs plentifully under stones near high-water mark on the chalky shores of the south coast of England. The particular piece of shore from which the specimens were first taken is delimited by a vertical cliff of chalk. Below this there is a short stretch of shore covered with masses of flints which fades into patches of flints and stones lying in small sandy hollows. Seaward this is followed by a very gently sloping floor of solid chalk on which lie occasional boulders of flint or chalk.

The tide travels over the chalk plain with little turbulence of the water, but when it rises to the shingle region it causes motion amongst the flints, which pound the chalk, and the water becomes full of chalk in suspension. This is roughly the region in which *G. planicrurus* occurs, so it would seem that the great development of fringes of bristles, mostly branched, is directly associated with the fine suspension. However, why the fringes should be so much reduced in the female is not clear.

In the general course of collecting it was found that *G. planicrurus* was the most abundant amphipod towards high-water mark, while *Calliopius crenulata* Chev. & Fage was quite plentiful near low-water mark. The latter occurred under boulders of chalk most frequently. On being disturbed they quickly retreated into small slit-like holes in the boulder. These holes had a very uniform appearance, but whether they had been made by the amphipod or not it was impossible to say.

Very few other species were found. A few specimens of *Gammarus locusta* (L.) and *Dexamine spinosa* (Montagu)



Gammarus planicrurus, sp. n.

Male.—*a*, head; *b*, mandible; *c*, maxilliped; *d*, 1st gnathopod; *e*, 2nd gnathopod; *f* to *j*, 3rd to 7th pereiopods; *k*, urosome and telson, dorsal view; *l*, uropods; *m*, epimeral plates.
Female.—*n*, 1st gnathopod; *o*, 2nd gnathopod; *p*, 7th pereiopod.

All are drawn to the same scale except *b* and *c*, which are much enlarged.

and one *G. obtusatus* Dahl were collected. Their scarcity suggests that they were mere stragglers.

It is interesting to speculate on the age of this new species. If the bristles are associated with the presence of suspended matter in the water, as is not unlikely, since it has been shown that such may affect crabs (Garstang, 1897) and polychætes (Reid, 1929), some correlation is possible. Assuming this adaptation to be the case, then the fringed form would not have appeared until it came in contact with water carrying large quantities of finely divided matter. This could not have happened till the chalk was exposed to wave action. We have reason to believe that this did not occur until quite late, certainly not before the Miocene, and probably much later. Beyond this, unfortunately, it is not possible to go at the moment, but it is something when we are dealing with a group with few fossil representatives. Perhaps investigation of the amphipod fauna of other waters which carry silt might throw some light on this problem, especially if the streams were of later date than the habitat under discussion. I suggest that it might be worth while making an examination of the River Parrit in Somerset, which carries a considerable quantity of the fine silt which used to be compacted and sold as "bath-brick." An even younger habitat would be found in the kaolin bearing streams which leave the dumps at the old china-clay mines in Cornwall.

General Description.

Since the male is more characteristic than the female its description will be given first.

Male.—Length 9 mm. Body semi-translucent white without any colour-spots or other markings. If the gut is filled with matter this may give a temporary tinge to the body.

The head-lobes are slightly produced forward at the antero-dorsal corner, otherwise they are truncated. The eyes are large, straight or very slightly reniform, and jet-black. In the 1st antenna the joints of the peduncle get increasingly shorter distally. The 1st joint is equal to the 2nd and 3rd together. The flagellum has 21 articulations and the accessory flagellum 5. The last two joints of the 2nd antenna are subequal. The flagellum has 12 articulations and calceoles. The peduncles of both antennæ are armed with long bristles.

Side-plates 1–4 each bear a comb-like fringe of bristles on the ventral border. The 3rd epimeral plate, like the 2nd, inclines slightly backwards and the posterior angle is a little less than a right angle. All three plates have posterior bristles and 7 or 8 groups of bristles on the ventral border. The urosome has few spines. The first segment has a fringe of bristles along its posterior dorsal edge and no spines. The 2nd segment has one lateral spine on each side and a median group of bristles. The 3rd segment is similar to the 2nd. The telson is cleft to the base, each half having a terminal spine and a lateral spine towards the outer border which has a comb of bristles along it extending to the apex. The 1st gnathopod is fairly strong. The palm is long and slightly excavate and clearly separated from the posterior border by a definite angle and two spines. There is one spine in the middle of the palm which the finger crosses. The other joints of this limb are rather thick. The 6th joint of the 2nd gnathopod is broadly ovate, the length being about 1⅜ times the breadth. The palm passes smoothly into the posterior border, with three spines at the junction and one palmar spine. The finger is rather short and sharp pointed. The 5th joint is almost as broad as long.

The 3rd pereiopod has a strong fringe of bristles on the 4th and 5th joints. The 4th pereiopod has a similar fringe, but of shorter bristles. From and including this one all the limbs taper steeply towards their distal extremity.

The 5th, 6th, and 7th pereiopods are short and thick (the 7th being the shortest) and have long tufts of bristles on both edges which may even be matted to such an extent as to hide the outline of the limb. There are no bristles on the posterior border of the 3rd joint nor on the anterior border of the 2nd joint. The 6th and 7th pereiopods are heavily armed with long spines also, but they are often difficult to see because of the bristles.

The pleopods are normal except for the long bristles which are irregularly placed on the peduncle.

The peduncles of the 1st and 2nd uropods have a fringe of bristles on their external border. The rami of the

1st uropod are about half the length of the peduncle, while the peduncle is considerably shorter in the 2nd uropod. The 1st and 2nd uropods do not pass the peduncle of the 3rd, which, in its turn, is little longer than the telson. Its outer two-jointed ramus is long and fringed with branched bristles on both edges, and a few spines also. The 2nd joint is short. The inner branch is scale-like and is usually, but not always, armed with a terminal spine and a few bristles. There is a small spine halfway along the inner border.

Female.—Length 5 mm. It is much smaller and lighter in build than the male. It carries about six eggs (January). Although it is of the same general form and has the same structural characteristics as the male it has not the same heavy fringes of bristles. However, there appears to be a small amount of variation in the extent of this.

The flagellum of the 1st antenna has fourteen joints and that of the 2nd has nine and is without calceoles. The 6th joint of the 1st gnathopod is ovoid and the finger is weak. The other joints are heavy, like those of the male. The 6th joint of the 2nd gnathopod is almost rectangular. The breadth is little more than half the length. The penultimate joint is much longer than broad. In the male the last joint of the 1st gnathopod is shorter than that of the 2nd, whereas in the female they are about the same length.

The brood-plates are normal.

As has been indicated the fringes of bristles on the limbs and side-plates are much reduced in density in the female. The basal joints of the last three pereiopods are broad, especially that of the 7th, which is almost as broad as long.

The mouth-parts of this species are normal except for a slight excess of hairiness in the case of the mandibular palp and the maxillipeds.

Type-locality is the beach at Saltdean, Sussex.

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XXVII. *Some Additional Pliocene Fossils from Cyprus.*

By F. R. COWPER REED, Sc.D., F.G.S.

[Plate IX.]

A SMALL collection of Pliocene fossils from a new locality on the south coast of Cyprus, which has recently been sent me for determination by Mr. C. P. Manglis of Nicosia, includes some species not previously recorded by the author from that island (Ann. & Mag. Nat. Hist. (10) vol. xvi. 1935, pp. 489-524, pls. xiii.-xvii.), as well as two new species of gastropods and a caudal vertebra of a species of dolphin which Dr. A. T. Hopwood of the British Museum has kindly determined for me as probably *Delphinus delphis* Linné, a species occurring in the Italian Pliocene. The fossils were obtained from two succeeding beds of clays at a spot 4 miles due west of Zyyi, which is situated about 4 miles west of Cape Dolos. The following is a list of the species, which indicate a Lower Pliocene (Plaisancian) age for the beds, with several species showing Miocene affinities.

(1) Greenish-grey sandy clays on the south coast of Cyprus, 4 miles west of Zyyi.

Ostrea (*Pycnodonta*) *hörnesi* Reuss, var.
Pecten sp.
Arca (*Anadara*) *diluvii* Lk.
—— —— —— var. *pertransversa* Sacco.
Chama gryphoides Lk.
Ventricola (*Antigona*) *multilamella* L.
Pleurotoma (*Bathytoma*) *cataphracta* Br.
Fusus longiroster Br.
Chenopus uttingeri Risso.
Tritonium (*Sassia*) *appenninicum* (Sassi) var. *cypria* Reed.
—— (——) *manglisi*, sp. n.
Cassidaria zenonis, sp. n.
—— *echinophora* Linn. var. ?
Turritella (*Zaria*) *subangulata* Br.
Conus (*Chelyconus*) *ponderosus* Br. var. *fuscoclavata* Sacco.
—— (*Conospirus*) *antediluvianus* Brug. var. *turritospira* Sacco.
Natica (*Naticina*) *fusca* Blainv.
—— *millepunctata* Lk.

Nassa (*Amycla*) *semistriata* Br.
Antale novemcostatum Lk.

(2) Greyish buff-coloured sandy clays, above the greenish-grey sandy clays.

Ostrea sp.
Amusium cristatum Brn.
Arca (*Anadara*) *diluvii* Lk. var. *pertransversa* Sacco.
Isocardia cor L.
Fusus longiroster Br.
Drillia allioni Bell.
Turritella (*Zaria*) *subangulata* Br.
Natica (*Naticina*) *fusca* Blainv.
Antale novemcostatum Lk.
Psygmobranchus sp.

A railway trench at Kannoures near Zyyi yielded from a light-coloured sandy clay *Flabellipecten alessii* Phil. and internal casts of indeterminable species of *Pectunculus*, *Ventricola*, *Meretrix* ?, *Trochus*, and *Turritella*. The bed is probably of Middle Pliocene (Astian) age.

The specimens are deposited in the Sedgwick Museum, Cambridge.

Cassidaria zenonis, sp. n.

(Pl. IX. figs. 1, 1 *a*, 1 *b*.)

Shell ovoid, turrited, composed of six whorls of which five compose the low-stepped spire, which forms more than one-third the total height of the shell. Apical angle about 45°. Canal short, narrow, twisted, acutely pointed and sharply bent sideways and slightly upwards. Mouth elongated, sublanceolate, with short notch at upper end; outer lip thickened and reflected, forming a rounded marginal roll with its inner edge crenulated for its whole length; columellar border of mouth crenulated in upper and lower third of inner part of the wide flattened reflected inner lip, which has its upper part adherent to the basal whorl but its lower part projecting free. Basal whorl large, convex, longer than wide, with undefined slightly flattened upper part of lateral face immediately below peripheral line of blunt, low, compressed, subtriangular equidistant spines, which are elongated, connected laterally, and situated at the subangular junction of the lateral and apical faces of this and succeeding whorls; lateral face of this and other whorls making an angle of about 130°, with flat sloping apical face; rest of surface of whorls ornamented with thick rounded equal equidistant and revolving lines, with rarely a finer line between them.

Dimensions.—

	mm.
Height of shell	70
,, ,, spire	26
Diameter of basal whorl	40
Length of mouth	35

Remarks.—This species is closely allied to the variety of *Morio* (*Galeodea*) *echinophora* Linn., which Sacco (1890, pt. 7, p. 60, t. ii. fig. 10) described from the Plaisancian and termed *pseudotyrrhena*, but it differs from it in its higher and more acutely pointed spire, thereby resembling *M.* (*Galeodea*) *miocristata* Sacco (1890, pt. 7, p. 61, t. ii. figs. 12 *a*, *b*) from the Helvetian, which has also a similar narrow bent canal and the same shaped mouth. But *M.* (*Galeodea*) *tauroglobosa* Sacco var. *subtuberculare* Sacco (1891, pt. x. p. 4, t. ii. fig. 81) from the Bartonian ? of Italy is most like it. Hörnes (1856, p. 183, t. 16, fig. 6) has figured one specimen of *M.* (*G.*) *echinophora* from Baden which agrees in most respects with our species, except that the spire is shorter and the basal whorl more globose. Cossmann (1903, pt. v. pp. 129–31) has contended that *Cassidaria* Lamarck, 1812, is best adopted as the generic name for this group of species, because *Morio*, 1810, Montfort, is apparently preoccupied and *Galeodea* was certainly in use for other distinct genera in the preceding century.

Tritonium (*Sassia*) *manglisi*, sp. n.

(Pl. IX. figs. 2, 2 *a*.)

Shell tall, conical, turrited, composed of 7–8 whorls, the basal whorl occupying about half the total height of the shell; apical angle about 30°; each whorl has an angulated and tuberculated periphery, the apical and lateral faces meeting at an obtuse angle. Canal narrow, pointed, slightly twisted, bent sideways and slightly upturned. Mouth oval, with small posterior notch (=“gutter”); outer edge of mouth furnished with prominent thickened rounded marginal varice crossed by 8–10 thick equidistant rounded continuations of the nodulated revolving lines on the basal whorl, and separated from the surface of this whorl by a pitted groove and from the true outer lip of the mouth by a deep simple groove, inside which the thickened outer lip of the mouth is furnished with 7–8 equidistant nodular swellings (= "teeth") situated on a rounded marginal rim; inner lip of mouth thin, expanded, reflexed, and adherent to surface of whorl, narrow in lower anterior half, with a few transverse ridges at base, but widening above (posteriorly) into a thin subtriangular plate extending up to the angular periphery of the basal whorl. Basal whorl having an indistinctly defined, very slightly flattened lateral face immediately below the angular periphery, bearing a median revolving line of small tubercles and indistinctly marked off from the basal surface by a revolving line of rather larger tubercles; basal surface of basal whorl having 3 distinct revolving lines of smaller tubercles, followed below on the elongated canal by 10–12 much smaller and closer set lines which are minutely tuberculated; apical face of basal whorl sloping, flattened and bearing two revolving lines of small tubercles on its upper two-thirds; periphery of basal whorl angulated and bearing blunt subtriangular prominent spinose tubercles larger than those on the lateral face and prolonged upwards on the apical face and to a less extent downwards on the lateral face so as to form thin weak short costæ; interspaces between the lines of tubercles ornamented on all faces with very fine revolving striæ. Tuberculation and ornamentation on upper whorls of same character as on basal whorl. A strong varice crosses the basal whorl in a longitudnial line with the inner side of the canal, and a smaller varice is present on the opposite side of the next whorl; the upper succeeding whorl has a very small varice in a line with the marginal varice of the mouth.

Dimensions.—

	mm.
Height of shell	48
Diameter of basal whorl	14

Remarks.—This species, which is represented by only one specimen complete except for the tip of the anterior canal, is most nearly related to *Tritonium* (*Sassia*) *appenninicum* Sassi (Cossmann, 1903, pt. v. p. 93, pl. iv. figs. 1, 2; Sacco, 1904, pt. xxx. p. 37, t. x. figs. 18, 19), a species which ranges from the Tongrian to the Plaisancian inclusive. The variety *granosa* Bellardi, as figured by Montanaro (1935, p. 79, t. vi. figs. 23 *a*, *b*), from the Miocene of Modane, also shows a considerable resemblance to it. It is quite distinct from the previously described *Tritonium* (*Sassia*) *appenninicum* var. *cypria* Reed (1935, p. 508, pl. xvii. figs. 3, 3 *a*) from another Pliocene locality in Cyprus.

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——. 1891. *Ibid.* pt. x.
——. 1904. *Ibid.* pt. xxx.

EXPLANATION OF PLATE IX.

Figs. 1, 1 *a*, 1 *b*. *Cassidaria zenonis* sp. n. Three views of the one specimen. Nat. size.

Figs. 2, 2 *a*. *Tritonium* (*Sassia*) *manglisi*, sp. n. Two views of the one specimen. × 1½.

XXVIII.—*Entomological Expedition to Abyssinia*, 1926–7. *Coleoptera*, Psephenidæ, Dryopidæ, Elmidæ. By H. E. HINTON, Ph.D. (Department of Entomology, British Museum (Natural History)).

THE species described in this paper are the first representatives of the Psephenidæ and Dryopidæ recorded from Abyssinia. Of the third family, the Elmidæ, only one previous record exists, and this is mentioned below under the heading of the family. Brief remarks on biogeographical relationships will also be found under the headings of the three separate families. Most of the material was collected by Mr. J. Omer-Cooper, but in two species the material was obtained by Dr. Hugh Scott in places which Mr. Omer-Cooper did not visit.

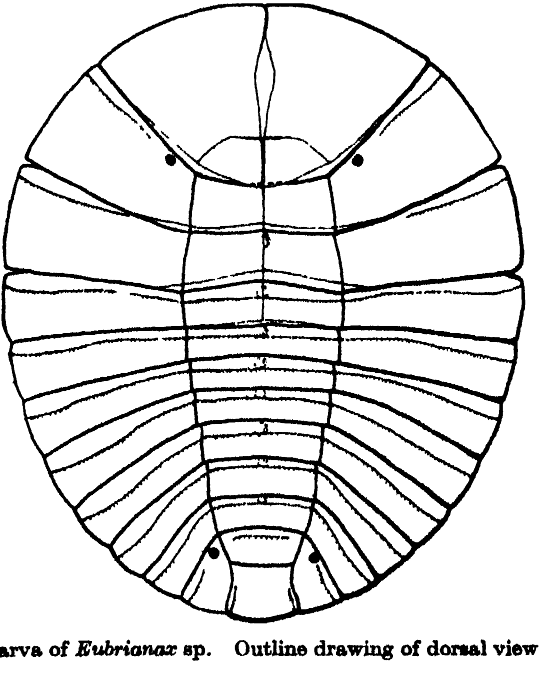
For figures 8 and 12 I am indebted to Miss O. F. Tassart. Other illustrations are drawn by myself with the aid of a camera lucida; lines next to figures refer to a length of 0·20 mm., unless otherwise indicated.

Types.—Paratypes and other material are in the British Museum.

Psephenidæ.

In the collections before me are two larvæ which undoubtedly belong to the genus *Eubrianax* Kiesenw.

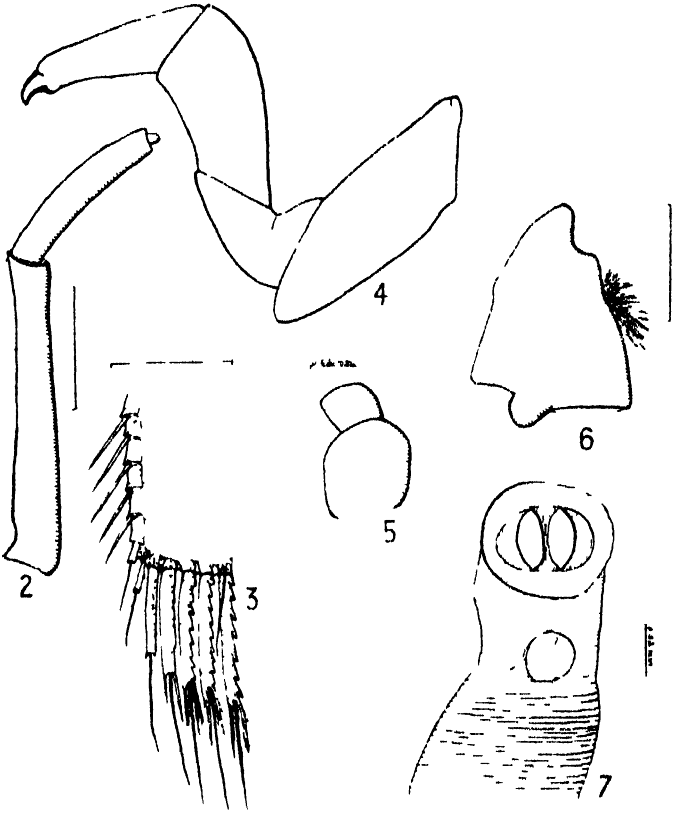
Fig. 1.



Larva of *Eubrianax* sp. Outline drawing of dorsal view.

Twenty-four species and one subspecies of *Eubrianax* have been described, and the majority of these occur in the Oriental Region, only three being so far recorded from Africa. The larvæ of two species have been described, *E. edwardsi* Lec. (Essig, 1926; Böving, 1929; Blackwelder, 1930; Böving and Craighead, 1931; Hinton, 1939) of western North America, and that of an undescribed species (Imms, 1933) from the Belgian Congo.

The larva described by Imms is probably that of *E. vittaticollis* Pic (1934), which has been recorded from the same region.



Larva of *Eubrianax* sp.

Fig. 2.—Antenna.
Fig. 3.—Chætotaxy of posterior angle of fourth abdominal tergite.
Fig. 4.—Ventral view of right front leg.
Fig. 5.—Maxillary palp.
Fig. 6.—Ventral view of right mandible.
Fig. 7.—Spiracle of eighth abdominal segment.

Eubrianax sp. (Figs. 1–7.)

Mature larva.—Length 8·0 mm.; breadth (at broadest point, which is across first abdominal segment) 6·7 mm. Cuticle brownish-testaceous to brown. Rather similar to

E. vittaticollis Pic, but easily distinguished as follows:— (1) the third antennal segment (fig. 2) has its base at the centre of the apex of the second instead of on inner lateral side, and there is here no cylindrical palp-like process as in *vittaticollis* (and also *edwardsi* Lec.); (2) the mandible (fig. 6) is at least a third longer than broad, whereas in *vittaticollis* it is only very slightly longer than broad (21·5 : 23); (3) the basal segment of the maxillary palp (fig. 5) is only slightly more than twice as long as second, whereas in *vittaticollis* the basal segment is at least three times as long as second; and (4) the middle of each tergite has the apical sides of each lateral fringe seta (fig. 3) produced to form very fine hair-like setæ instead of having these sides stoutly and only slightly produced.

Loc.—Abyssinia: Douber River, between Debra Libanos and Addis Ababa, about 8500 feet, 5. i. 1927 (*Scott*). Two apparently mature larvæ, both taken under stones in the river.

Dryopidæ.

Dryops gracilis Karsch (1881).

Loc. Abyssinia: Lake Zwai, marsh on western shore, 5500 feet, 2–3. xi. 1926, 7 ♂, 19 ♀; Lakes of Addas, Hora Harsadi, 7000 feet, 1. xii. 1926, 3 ♂, 5 ♀; Hora Keloli, 7000 feet, 4. xii. 1926, 3 ♀, and Hora Bishoftu, 7000 feet, 2. xii. 1926, 2 ♀. 39 specimens altogether (all *Omer-Cooper*).

It has been recently shown by Bollow (1938) that this species is common in Spain, Portugal, and North Africa, and it may therefore be considered to be one of the Palæarctic faunal elements of the highlands of Abyssinia.

Elmidæ.

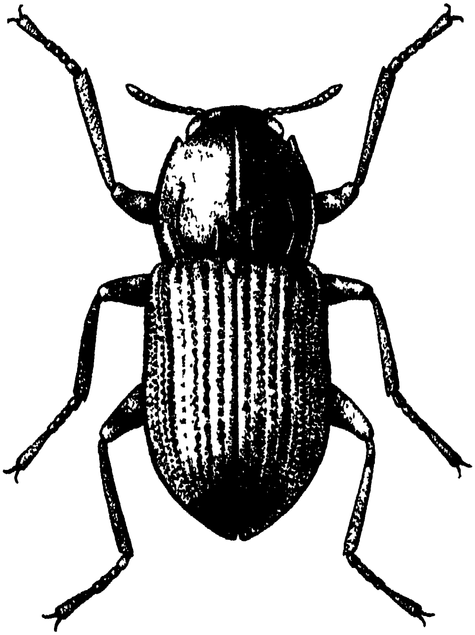
I can only discover one previous record of a species of this family from Abyssinia, *Potamodytes zavattarii* (Bollow) (1937). This species is also recorded from Italian Somaliland.

POTAMODYTES Grouvelle.

1896. *Potamodytes* Grouvelle, Bull. Soc. ent. France, p. 78, 1896; Grouvelle, Ann. Soc. ent. France, lxxv. p. 146, 1906; Hinton, Ann. & Mag. Nat. Hist. (10) xix. p. 289, 1937.
Grudelliana Bollow, Atti Mus. Civ. Storia Nat. Trieste, xiv. p. 149, 1937 (new synonymy).

Bollow (*op. cit.*) has given an excellent description of the type (by monotypy) of *Gridelliana*, and from this description I have no hesitation in relegating his genus to synonymy with *Potamodytes*. According to him *Gridelliana* may be distinguished from *Potamodytes* by the structure of the pronotum, the apices of the elytra, the prosternal process, and the abdomen. His descriptions and figures of these structures are those of a typical species of *Potamodytes*.

Fig. 8.

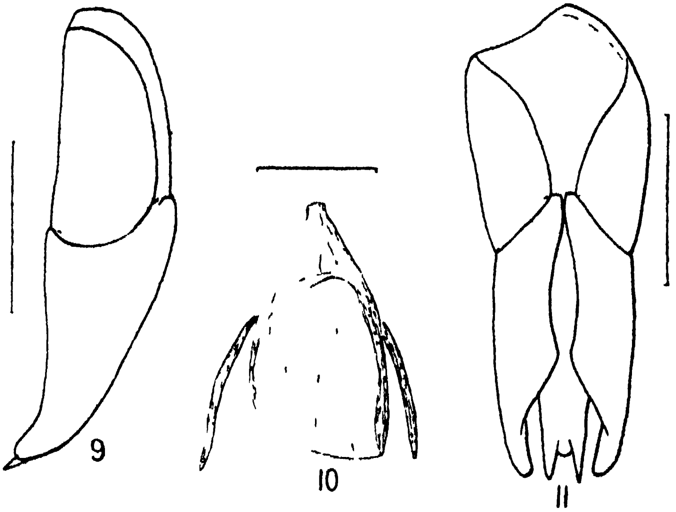


Microdinodes troilus, sp. n.

Twenty-five species of *Potamodytes* have been described, four from Madagascar and the remainder from Africa. None of the African species occurs in the northern or Palæarctic part of Africa.

Microdinodes troilus, sp. n. (Figs. 8–11.)

Male.—Length 2·32 mm.; breadth 1·06 mm. Broad, subparallel, moderately convex. Cuticle feebly shining brownish-piceous; pronotum black; antennæ and mouthparts brownish-testaceous. *Head* without distinct impressions; middle behind posterior margins of eyes slightly more convex than elsewhere; surface with shallow, round to irregular punctures which are slightly finer than facets of eyes and are separated usually by a third to one diameter, though on middle behind eyes they are much sparser; scale-like tomentum of head gives the surface the appearance of being densely, minutely asperate. Clypeus with anterior margin shallowly, arcuately emarginate for its entire breadth and angle on each side very broadly rounded; surface sculptured like that of head. Labrum with anterior margin feebly, arcuately emarginate at middle and angle on each side broadly rounded; surface with punctures about a third as coarse as facets of eyes and usually separated by two to four diameters; surface between punctures smooth and polished. *Pronotum* with broadest point, which is at basal third, broader than long (0·90 mm. : 0·80 mm.), and base broader than apex (0·82 mm. : 0·63 mm.). Impressions and carinæ as figured (fig. 8). Surface of disk with punctures about half as coarse as facets of eyes and confluent to separated by two diameters; surface of disk also with a few round punctures which are as coarse as facets of eyes; surface on anterior two-fifths from about lateral third to lateral margins with punctures about a third coarser than facets of eyes and generally confluent, so that surface has appearance of being densely rugose. *Elytra* twice as long as pronotum (1·64 mm. : 0·80 mm.) and with broadest point, which is at about apical two-fifths (1·06 mm.), only slightly broader than broadest point across humeri. Elytron with a row of round to feebly oblong granules which are about as coarse as facets of eyes and on eighth interval extend to apical third, on seventh to apical fourth, on sixth are denser and more prominent than elsewhere and extend to produced portion of apex, while on fourth there is on inner side of interval a feebly developed row which does not extend beyond middle. Surface of intervals feebly and irregularly alutaceous, and also with numerous punctures as fine as finer ones of pronotal disk and separated usually by two to four diameters. Striæ distinct throughout, moderately broad and shallow; strial punctures on disk (first three striæ) round to subquadrate, usually a third, though occasionally half, as broad as intervals, and separated longitudinally usually by one diameter. *Scutellum* flat, longer than broad (0·137 mm. : 0·109 mm.), base nearly truncate, and surface feebly depressed on middle and more regularly and much more densely punctate than adjacent elytral intervals. *Prosternum* irregularly, shallowly punctate on middle region, so that surface appears feebly rugose, and at sides near hypomera with prominent granules which are about as coarse as facets of eyes and are separated by one to two diameters. Hypomera with shallow, round punctures slightly coarser than facets of eyes and separated by one to two diameters. Metasternum with median longitudinal line complete, broad, shallow, and with deepest part on posterior third; metasternal disk punctate like middle region of prosternum, and at sides with a few granules as coarse as facets of eyes; tomentose sides of metasternum with low, flat-topped granules about as coarse as facets of eyes or slightly finer and separated by two to four diameters. *Abdomen*



Microdinodes troilus, sp. n.

Fig. 9.—Left lateral view of male genitalia.
Fig. 10.—Spicule.
Fig. 11.—Dorsal view of male genitalia.

without trace of carinæ on first sternite; middle region of first sternite not distinctly depressed; anterior half with a few round, flat-topped granules which are slightly coarser than facets of eyes; between granules and elsewhere on sternite densely, very finely asperate. Sternites two to five with the granules finer, sparser, and (as on first) obsolete before lateral margins; granules on apical region of fifth frequently oblong; surface between granules finely, densely asperate. *Genitalia* as figured (figs. 9 and 11).

Female.—Externally similar to male.

Loc.—Abyssinia: Jem-Jem Forest, in small stream, 8000 feet, 10. x. 1926, 1 ♂ (type), 2 ♀ (paratypes) (*Omer-Cooper*).

Variations.—One of the female specimens has no row of granules on inner side of the fourth elytral interval, and the discal strial punctures are distinctly finer than those of the type. The middle region of the abdominal sternites of this specimen is nowhere distinctly asperate, but, on the contrary, is often smooth and polished between the granules or sparse and fine punctures.

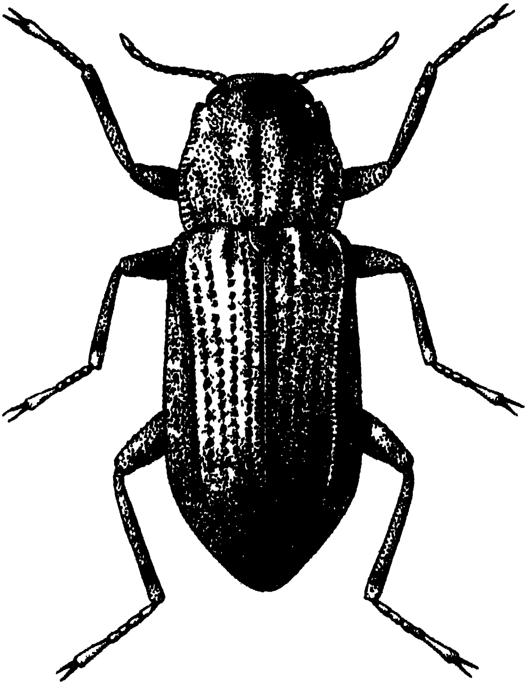
Comparatives Notes.—This species is very different from any known to me.

All the species of *Microdinodes*, as far as is known, are confined to the non-Palæarctic parts of Africa.

Stenelmis scotti, sp. n. (Fig. 12.)

Female.—Length 3·3 mm.; breadth 1·39 mm. Oblong, subparallel, moderately convex. Cuticle shining, black; antennæ, mouth-parts, and tarsi moderately pale rufopiceous. *Head* without distinct impressions; surface with round granules slightly finer than facets of eyes and separated usually by one to two diameters. Clypeus with anterior margin shallowly, arcuately emarginate for entire breadth and angle on each side broadly rounded; surface sculptured like head, but with granules slightly denser. Labrum with anterior margin feebly rounded at middle and angle on each side very broadly rounded; surface on anterior middle third with a few fine punctures, and surface between punctures, smooth; surface elsewhere with similar punctures, which are often, particularly at sides, replaced by granules which are about two-thirds as coarse as facets of eyes. *Pronotum* across broadest point, which is between basal third and basal two-fifths, broader than long (1·15 mm. : 1·04 mm.), and base broader than apex (1·01 mm. : 0·73 mm.). Surface with impressions and carinæ as figured (fig. 12). Surface generally with round granules, which are distinctly coarser than facets of eyes or about 0·0275 mm. broad and are usually separated by half to one diameter; on anterior middle fourth of disk these granules become distinctly finer and sparser; surface between granules microscopically punctate. *Elytra* two and a half times as long as pronotum (2·54 mm. : 1·04 mm.), and broadest point, which is at apical two-fifths (1·39 mm.), slightly but distinctly broader than broadest point across humeri. Sublateral carina, which is on sixth interval, prominent and extending to apical fifth. Intervals flat

Fig. 12.



Stenelmis scotti, sp. n.

except for third, which is strongly convex from near base caudally for a distance equal to twice length of scutellum; surface of intervals feebly, irregularly alutaceous, with numerous microscopic punctures, and near base with low round granules similar to those of middle pronotal disk. Striæ shallow, everywhere distinct; strial punctures on disk round to subquadrate, a third to half as broad as intervals, and separated longitudinally by less than one to one diameter. *Scutellum* flat, subovate, with base nearly truncate, longer than broad (0·21 mm.: 0·19 mm.), and surface sculptured like adjacent elytral intervals. *Prosternum* with punctures about a third coarser than facets of eyes and often confluent; surface also with numerous round granules, particularly at sides. Hypomera sculptured like sides of pronotal disk. Metasternum with median longitudinal line nearly complete, narrow, and on posterior half broader and deeper than elsewhere; disk flat, surface with oval punctures about 0·03 mm. long, deep, and separated usually by two-thirds to one diameter; on anterior rim of each of these punctures is a small to large tubercle from which arises a short, fine, posteriorly directed, testaceous seta; sides of metasternum granulate like base of pronotum, but slightly more finely so. *Abdomen* with middle region of first sternite feebly depressed on anterior third; without distinct carinæ; surface of first and other sternites densely granulate and punctate, both granules and punctures becoming finer apically. Fifth sternite with middle apical margin broadly, deeply, and truncately emarginate. *Claws* without teeth.

Male.—Unknown.

Loc.—Abyssinia: Mulu, above Muger Valley, about 8000 feet, 18–23. xii. 1926, 1 ♀ (type) (*Scott*).

Comparative Notes.—I know of no species sufficiently close to this to make a comparison profitable.

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XXIX.—*Description of a new Race of Puma* (Puma concolor), *with a Note on an Abnormal Tooth in the Genus.* By R. I. Pocock, F.R.S., Zoological Department, British Museum (Natural History).

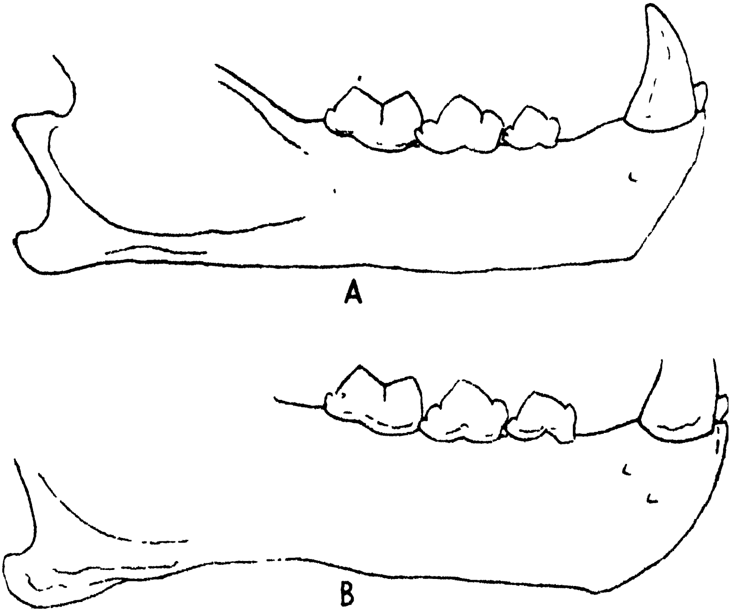
There are two races of Puma in the southern part of the Neotropical Region, *P. concolor puma* Molina, found in Chili, and *P. concolor pearsoni* Thomas, found in Patagonia, the typical locality of the latter being Santa Cruz, about 51° S. lat. Of the named races from farther north, the southernmost is *P. c. osgoodi* Nelson and Goldman, from Santa Cruz in Bolivia. The British Museum has skulls of both the southern races, including a good series of *pearsoni*, and also a good series of the Bolivian race, which extends to adjoining districts of Brazil, *i. e.*, to Matto Grosso. As Cabrera pointed out, *pearsoni* changes slightly in the north of its range. This is attested by a skull in the British Museum from Rio Rifles, Buenos Ayres, which may be left under that name. But still farther to the north, in the Argentine, the differences are sufficiently well marked to receive nominal distinction.

Puma concolor cabreræ *, subsp. n.

Locality of the type.—La Rioja, 968 m., in the northern Argentine, just north of 30° S. lat. Type, an adult skull, identified as ♂ (no. 74.8.4.2. ; A. Roff). No skin.

A race intermediate in many cranial characters between *P. c. puma* and *P. c. pearsoni* on the one hand and *P. c. osgoodi* on the other.

Fig. 1.



A. Right ramus of mandible of *Puma concolor cabreræ*, from La Rioja, Argentina, showing the comparatively flat chin and the nearly straight lower border.

B. The same of *P. c. pearsoni*, from Tierra del Fuego, showing the convex chin and the more sinuous lower border. In this specimen the emargination of the posterior half of the lower border is exceptionally deep for this race.

The skull has the same condylobasal length as the ♀ skulls of *puma* and *pearsoni*, known to me, but is decidedly shorter than the ♂ skulls of the latter in the British Museum, there being no adult ♂ skull of *puma* wherewith to compare it. It is distinguished principally from the skulls of those races, more particularly from

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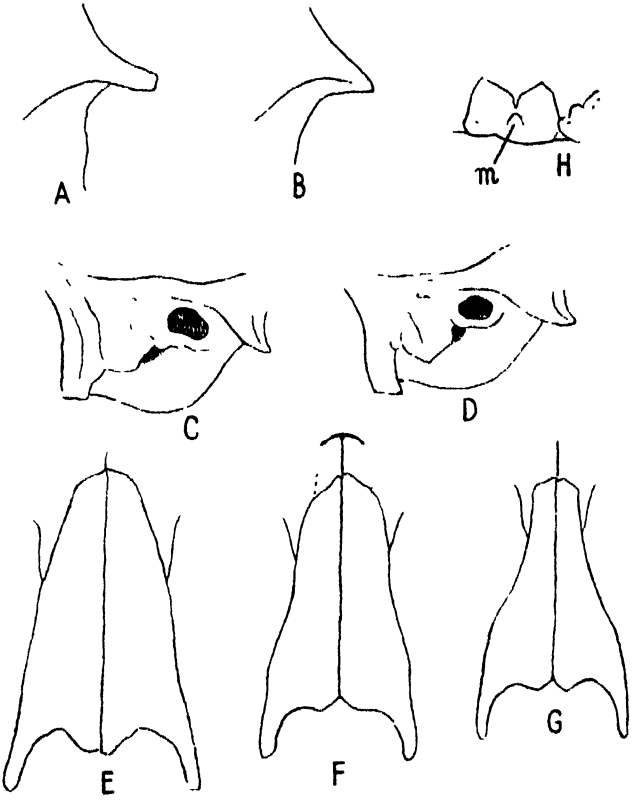
* Dedicated to Dr. A. Cabrera in acknowledgment of his intelligent and informative paper on the Chilean and Argentine Pumas (Revista Chil. Hist. Nat. xxxiii. pp. 312–320, 1929).

Fig. 2.



A. Right postorbital process of *Puma concolor cabreræ*.
B. The same of ad. ♂ of *P. c. osgoodi* (B.M. no. 26.1.12.2), from Santa Cruz, Bolivia.
C. Lateral view of right bulla of the same.
D. The same of *P. c. cabreræ*.
E. Nasals of *P. c. pearsoni*, from Tierra del Fuego.
F. The same of *P. c. cabreræ*.
G. The same of the example of *P. c. osgoodi* (no. 26.1.12.2).
H. Inner view of left lower carnassial of the same, showing the abnormal cusp identified as the metaconid (*m*).

(All figures two-thirds nat. size.)

pearsoni, in its less robust muzzle, the upper portion of the maxillæ being compressed. The nasals also are affected by this compression, their outer edges being more concave than in any of the skulls of the other two races, but they are broad behind and end in a widely obtuse angular point; behind this point there is a longish pit with sloping sides, and defined behind by a strong crescentic edge (fig. 2, A, B). There is nothing approaching this pit in any of the skulls of *puma* or *pearsoni* I have seen. The dorsal profile is arched, with the occiput depressed, resembling in these respects the average of the skulls of *pearsoni*, but the postorbital processes are much thinner and the muscular depression in front of the occipital crest is deeper. The teeth are decidedly smaller than in the ♂ skull of *pearsoni*, about the same size as in a young ♂ skull of *puma*; and the inner lobe or protocone of pm^4 is as in *puma*, not as in *pearsoni*.

The mandible differs a little from that of *puma* and *pearsoni* in having the lower edge straighter, less undulating, and the chin or symphysial region flatter, less convex (fig. 1, A, B).

I have a suspicion that this skull may represent the same race as a skull from Paraguay which Cabrera identified as *P. c. concolor* because of its general agreement, apart from the presence of the pit behind the nasals, with a skull from São Paulo, Brazil, wrongly determined by Merriam as *concolor*. Cabrera drew attention to the flatness of the chin and the straightness of the lower edge of the mandible, and described the skull generally as more lightly built than in *puma* and *pearsoni*. All these features are shown by the type of *cabreræ*.

Although the type of *cabreræ* agrees with the largest adult ♂ skull in the British Museum of *osgoodi* from Buenavista, Santa Cruz, Bolivia (no. 26.1.12.2), in condylobasal length, in the width of the muzzle at the canines, in the development of the sagittal crest and the shape of the occipital region, it is a good deal wider across the zygomata, 147 as against 135 mm., and a little wider elsewhere, the mastoid widths being 86 and 81 mm., the maxillary widths above pm^4 86 and 80 mm., and the postorbital processes from tip to tip 78 and 73 mm. Since, however, it is an older skull, these differences may be, partly at all events, a matter of age. But the postorbital processes are much thinner, more rod-like, and less angular (fig. 2, A, B), and the bullæ are much less inflated. In the skull of *osgoodi* they project in profile view below the point of the paroccipital process and are 24 mm. wide as against 21, which results in the narrowed distance between them being only 17 mm. in the skull of *osgoodi*, whereas it is about the same as the width of the bulla in *cabreræ* (fig, 2, C, D). The latter also has bigger nasals, longer in the middle line and decidedly wider across the middle and posteriorly, and the pit behind them is much deeper and has a more sharply defined posterior edge (fig. 2, F, G). This pit, however, is variable in its distinctness in the series of *osgoodi* skulls from the type-locality, and in a ♂ skull from Matto Grosso it is nearly as pronounced as in the type of *cabreræ*. But in all the skulls of *osgoodi* the bullæ are more inflated and the nasals are relatively considerably shorter, although they vary greatly in shape, being alike in no two specimens. The two races agree on the average in the size and structure of the teeth, and also in the shape of the chin and lower edge of the mandible.

Some cranial and dental measurements of the two skulls of *cabreræ* and *osgoodi* compared above, and of an adult ♂ skull of *pearsoni* from Tierra del Fuego, for the donation of which I am indebted to Miss F. Walrond, are as follows :—

	Total length.	Cond.-bas. length.	Zygom. width.	Int.-orb. width.	Max. width.	Nasals (median length).	*c'*.	pm^4.	m_1.
pearsoni.	221	195	157	48	70	57	17	23½	20
cabreræ .	202	183	147	41	57	47	13½	23	17
osgoodi .	201	183	135	38	57	42	15	23½	18

It may be added that this skull of *pearsoni* has exceptionally long nasals, the average median length in 4 adult ♂ skulls being 53 mm. The average in 3 adult ♂ skulls of *osgoodi* is 42 mm. The teeth in the skull of *osgoodi* measured are exceptionally large, the average of the three teeth in the 3 ♂ skulls being 13½, 22, and 16½ mm. As regards the bulla, the average external length, width, and distance between in the 3 ♂♂ of *osgoodi* and the same actual dimensions in the type of *cabreræ*, the latter being put in brackets, are 31½ (30), 24½ (22), and 15½ (21) mm.

These Pumas will be further discussed in a forthcoming paper on the genus.

AN ABNORMAL TOOTH IN A PUMA.

In the skull of *Puma concolor osgoodi*, (no. 26.1.12.2), collected by Steinbach at the type-locality, Buenavista in Santa Cruz, Bolivia, the lower carnassial (m_1) shows a peculiarity I have not seen previously in any representative of the Felidæ, namely, the presence on its inner side of a distinct, though small, cusp which is presumably the homologue of the ancestral metaconid (fig. 2, H).

This tooth in the more primitive, largely omnivorous Carnivores has been described as composed of two main portions, an anterior triangular portion with three main cusps, the paraconid in front, and behind it the protoconid on the outer side and the metaconid on the inner; and a posterior, lower, crushing portion, the talonid, or "heel," which may be as wide and is sometimes about as long as the anterior portion But in the more specialized flesh-eaters this tooth has been independently modified in several families along the same lines, namely, reduction in size of the "heel," reduction or suppression of the metaconid, and conversion of the protoconid and paraconid into two biting blades which compose practically the whole of the crown of the tooth. Approaches to this specialized condition have been independently achieved by several genera of Arctoid Carnivora, *e. g.* by *Mustela*, *Gulo*, and *Mellivora*; and it has been independently perfected in the Æluroidea by the Felidæ, by *Crocuta* in the Hyænidæ, and by *Cryptoprocta* * in the Cryptoproctidæ, in which there is no trace of the metaconid and the "heel" is reduced to a small, seemingly functionless ridge or excrescence. Corresponding modifications in the rest of the dentition, equally convergent and adaptive, are well known.

The interpretation of this cusp as the metaconid is open to the criticism that it occupies an abnormally forward position on a level with the notch between the two main blades instead of behind on the inner side of the posterior cusp. The choice lies between regarding it as a new structure or as an atavistic metaconid. The latter alternative appears to me the more probable. It is entertaining, at all events, to reflect on the reaction to this Puma's tooth of some palæontologist's respect for dentition if it had been found as a "fossil."

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* I write this deliberately about *Cryptoprocta* because Dr. W. K. Gregory and M. Hillman have, in my opinion, spoilt their paper on the phylogeny and classification of the Æluroidea (Proc. Amer. Phil. Soc. lxxxi. no. 3, 1939)—a paper which interested me greatly, although it is open to much criticism—by digging up the idea, formerly held by a few zoologists with manifestly very little knowledge of the subject, that *Cryptoprocta* represents a primitive member of the Felidæ and belongs

XXX.—*A new Species of the Nematode Genus* Macropostrongylus. By H. A. Baylis, M.A., D.Sc., Department of Zoology, British Museum (Natural History).

A collection of Nematodes obtained by Miss L. E. Cheesman from a kangaroo (*Dorcopsis veterum*) in Japen Island, off the north coast of Dutch New Guinea, proves to consist mainly of an undescribed species of *Macropostrongylus* Yorke and Maplestone, 1926. It includes also two male specimens, apparently of a species of *Pharyngostrongylus*, but owing to their indifferent condition no attempt is made to describe these. All the worms are somewhat contracted, presumably as a result of fixation in cold alcohol, and the measurements of length given below would probably have been rather greater in life. The worms were found in the mouth and gullet of the host, but their true habitat was probably the stomach.

Macropostrongylus dorcopsis, sp. n.

Males measure 17–23 mm. in length and 1–1·25 mm. in maximum thickness, adult females 25–33 mm. and

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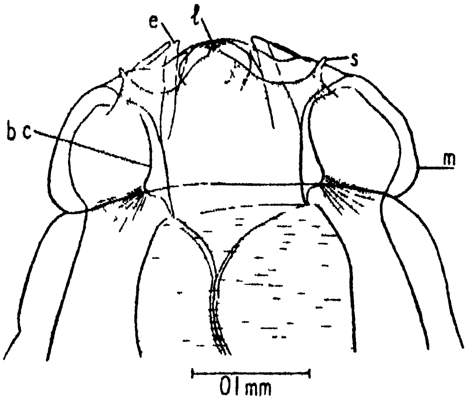
to that family stock. I hoped that idea was buried for all time. It is hardly credible that anyone acquainted with *Cryptoprocta*, alive or dead, can open a description of the animal with the epithet "Cat-like." It is most emphatically not "Cat-like," as I understand that term, either in appearance, general activities, or external characters (see Ann. & Mag. Nat. Hist. (8) xvii. pp. 413–424, 1916). The skull, moreover, differs from that of all the Cats in certain well-known features, and only approaches it in those notoriously plastic and adaptable organs the teeth. In my opinion the likeness, such as it is, in the teeth is not an indication of affinity, but the opposite. This applies also to *Crocuta*. But there is, I fear, little hope of our agreement on this subject because of the wide difference of opinion between us on the taxonomic values of structural characters. They state, for example, their conclusion "that *Cryptoprocta* is the little modified survivor of *Proailurus*, which was in turn at least a close relative of the direct ancestors of the cat-tribe." From what I know of these two genera I should feel compelled, if I thought the speculation worth making, to substitute "possibly may be" and "possibly may have been" for "is" and "was" in their sentence.

1·5–2·1 mm. respectively. The cuticle has very fine transverse striations at intervals of about 2–2·5 μ. There are also numerous irregular transverse wrinkles, mainly resulting from contraction. There is a well-defined mouth-collar (fig. 1, *m.*), having a transverse diameter of 0·25–0·28 mm. in the male and 0·3–0·32 mm. in the female. Its depth is about 0·13–0·15 mm., and the constriction separating it from the neck is at about the level of the posterior end of the buccal capsule. The length of the latter is difficult to define, as its anterior limit is not distinctly marked. Its wall (fig. 1, *b.c.*) is thickened posteriorly. At the mouth-opening there are eight large, subtriangular tooth-like processes (figs. 1 & 2, *e.*), which converge over the aperture and are probably to be regarded as the elements of a leaf-crown. Two of these processes are larger than the others, lateral in position and blunt-ended. Two, the smallest, are situated dorsally and ventrally, while four other processes, more pointed in shape, are submedian. A central ridge on the inner surface of each process arises from the wall of the buccal capsule. The lateral cephalic papillæ are not prominent, but the four submedian papillæ have short digitiform processes.

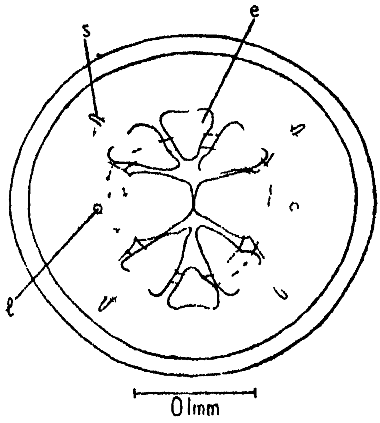
Fig. 1.



Macropostrongylus dorcopsis, sp. n. Anterior end of female ; lateral view.

b.c., buccal capsule ; *e.*, element of leaf-crown ; *l.*, lateral papilla ; *m.*, mouth-collar ; *s.*, submedian papilla.

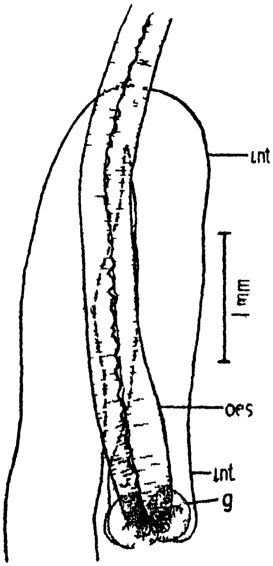
Fig. 2.



Macropostrongylus dorcopsis, sp n Anterior extremity of female, end on view

e, dorsal element of leaf crown, *l*, lateral papilla, *s*, sub median papilla

Fig 3.

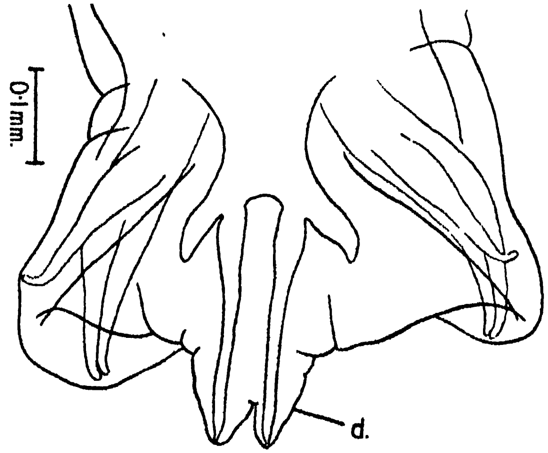


Macropostrongylus dorcopsis, sp n Portions of oesophagus (*oes.*) and intestine (*int.*) of female.

g., paired granular structure

The œsophagus is relatively long, measuring (from the extremity of the head) 4–5·7 mm. in the male and 6–6·5 mm. in the female. At its junction with the intestine it is embraced by a pair of granular structures (fig. 3, *g.*) similar to those found in *M. yorkei* and certain other species of the genus, but relatively small. In many specimens, perhaps as a result of contraction of the body-wall, the intestine doubles forward at this point (fig. 3), and makes an anterior loop before pursuing its usual straight course. The cervical papillæ have long, bristle-like terminations and are situated at about 0·8–1·1 mm. from the anterior extremity. The excretory pore is at about the same level, and the nerve-ring at about 0·8 mm. from the anterior end.

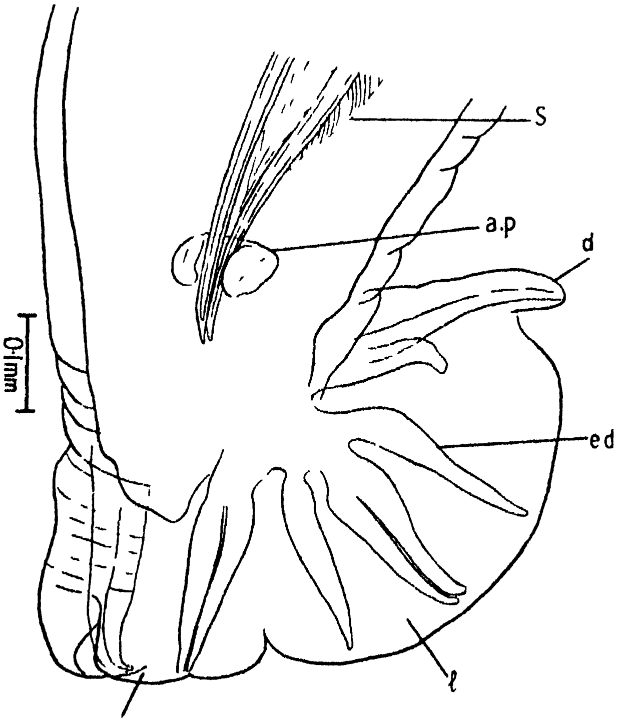
Fig. 4.



Macropostrongylus dorcopsis, sp. n. Bursa of male; dorsal view. *d.*, dorsal lobe.

The bursa of the male has a very prominent dorsal lobe, which is more or less bifid (fig. 4, *d.*). Each branch of the dorsal ray gives off at its base a rather short lateral branch. The ventral lobe of the bursa is not so distinctly marked off from the lateral lobes as in some members of the genus. On the other hand, it is distinctly cleft in the mid-ventral line, almost forming two separate lobes (fig. 5, *v.*). The arrangement of the lateral and ventral rays is as in other species, and the ray which is assumed to be the externo-dorsal (fig. 5, *e.d.*) originates, as in them, from the common trunk of the lateral rays. The spicules measure 1·9–2 mm. in length. They are provided with wide and conspicuously striated alæ, which appear to be joined together towards the tips of the shafts. The latter are pointed. The accessory piece (fig. 5, *a.p.*) is of semi-annular shape.

Fig. 5.



Macropostrongylus dorcopsis, sp. n. Bursa of male ; latero-ventral view. *a.p.*, accessory piece ; *d.*, dorsal lobe ; *e.d*, externo-dorsal ray ; *l.*, lateral lobe , *s.*, spicules ; *v.*, ventral lobe.

The tail of the female is tapering and measures 1·1–1·4 mm. in length. It has a small terminal spike, and bears a pair of papillæ at about 0·2 mm. from the tip.

The vulva, which is usually covered by a mass of cement, is situated at a distance of 0·9–1 mm. from the anus, or 2–2·4 mm. from the tip of the tail. There is a very short (about 0·25 mm.) vagina, giving off at right angles a pair of ovejectors with a combined length of about 1·3 mm. These are directly opposed at their origin, but the posterior ovejector bends forward so that the two uterine branches run parallel. The eggs measure about 0·12 × 0·068 mm.

Eight species of *Macropostrongylus* have been described from kangaroos and wallabies on the continent of Australia, but the present form is the first to be recorded from elsewhere. It is the largest species of the genus yet met with, the two forms approaching it most closely in this respect being *M. yorkei* Baylis, 1927, and *M. macrostoma* Davey and Wood, 1938. The most obvious character in which *M. dorcopsis* differs from all the previously-known forms is the relatively great length of the œsophagus. The nearest approach to it is made by *M. macrostoma*, in which the œsophagus measures up to 3·4 mm. in the male and 4·8 mm. in the female. The tail of the female in *M. dorcopsis* is also exceptionally long. In *M. yorkei* and in *M. labiatus* Davey and Wood the tail attains a length of about 0·4 mm., while in all the other species it is considerably shorter.

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YORKE, W., & MAPLESTONE, P. A. 1926. 'The Nematode Parasites of Vertebrates.' London

XXXI.—*A Note on certain Genera of Brenthid Coleoptera and Description of a new Species*. By GILBERT J. ARROW, British Museum (Natural History).

IN a paper on the remarkable genus *Anisognathus* in the Hungarian periodical 'Archivum Zoologicum,' 1910 (vol. i. p. 179), Dr. Bolkay announced the discovery that the asymmetrical head of the male was not, as supposed, a generic feature, but marked only one of two male phases, the other being found in the genus *Bolbocranius*. At the same time he described another East African representative of the genus, to which he gave the name *Anisognathus csikii*, figuring its two supposed phases, asymmetrical and symmetrical. This pronouncement was incorrect, the forms united being quite distinct, although closely related. Kleine's Catalogue of the Brenthidæ (1927) has rejected Bolkay's view, and treated *A. csikii* as a synonym of *A. distortus* Westw., the distribution of which is said to be the whole of Africa south of the Sahara.

Examination of the British Museum collection of these insects from various parts of Africa has satisfied me that there are undoubtedly two species of *Anisognathus*, the true *A. distortus* being confined to South Africa and the northern form agreeing with that described by Bolkay as the asymmetrical phase of *A. csikii*. This form may therefore be conveniently accepted as the type of that species.

The males of these two species of *Anisognathus* are easily separated by differences in the head. The left mandible of *A. distortus* has a strong tooth directed upward towards its extremity and is flattened at the base. That of *A. csikii* is without the tooth but has a strong vertical ridge at the base. The front of the head of *A. csikii* has a prominent process on each side, forming together a semicircular hollow, into which a posterior lobe of the right mandible fits. There is no such correlation of head and mandible in *A. distortus*. The females of the two forms can be distinguished by a slight difference in the club of the antenna, that of the northern form being rather more flattened and dilated.

The two genera *Carcinopisthius* and *Stratiopisthius* are remarkable for the production of their elytra at the hinder end into curving processes rather like the forceps in the Forficulidæ. The second genus was established in 1919 by Senna and Calabresi for *Hoplopisthius doriæ* Senna, of which only a single specimen, supposed to be a male, was known. The distinctive feature consists in the projection of the third, fifth and seventh elytral costæ above the posterior declivity. In Kleine's 'Bestimmungstabelle der Brenthidæ' the genus *Stratiopisthius* in 1938 still contained only this species, although *kolbei* and *papuanus* of Senna, referred by him to *Carcinopisthius*, were described as having the distinctive character of *Stratiopisthius*. *S. kolbei* was taken in the same place and described at the same time as *S. doriæ*, but differs in having the lobes of the elytral forceps bifurcated. This has been indicated as a feature of the male in *Carcinopisthius loriæ*, and it seems almost certain that *kolbei* is the male of *doriæ*, the unique type of the latter being a female.

Another species here described shows an identical sexual difference.

Stratiopisthius forficula, sp. n.

Rufo-fuscus, femoribus elytrisque, horum marginibus interioribus et exterioribus exceptis, pallidioribus; lævis, sat nitidus, antennis brevibus, articulis 2–8 sphæricis, compactis, 9–11 paulo majoribus et longioribus; capite et pronoto fere impunctatis, rostro supra sulcato, fronte lævi, pronoto profunde sulcato, lateribus antice fortiter compressis, postice rotundatis, elytris profunde sulcatis, intervallo 2 angusto, vix elevato, 3, 5 et 7 ante apicem fortiter dentatis, elytrorum parte terminali longa, extus haud dilatata, apice uncinato, ♀ apice simplici, ♂ apice profunde fisso.

Long. 5·5–10·5 mm.

E. Papua: Kokoda, 1200 ft., May to August (*Miss L. E. Cheesman*).

Numerous specimens of both sexes were taken.

The figure of the type-specimen of *S. doriæ* shows it to be a shorter insect than *S. forficula*, while it is considerably larger than the largest of the many specimens of the new form. The terminal processes of the elytra are quite different in shape. Those of *S. forficula* in the corresponding sex (female) are longer and narrower, their combined width being less instead of greater than the width of the body. The forceps-like extremities of *S. papuanus* Senna are also broad at the base, according to the description, and the produced end of the seventh costa is laterally prominent, which is not the case in *S. forficula*.

A sexual difference in the extremities of the elytra is often found in this family. In some the males have them produced into filamentous extensions of remarkable length.

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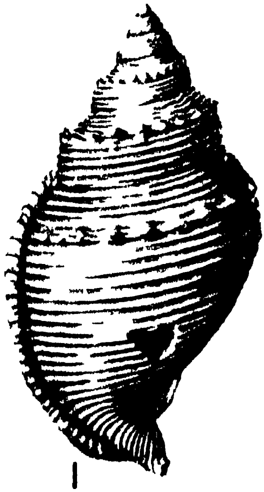

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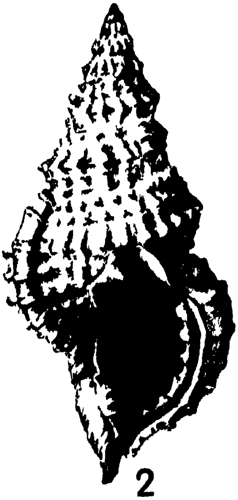

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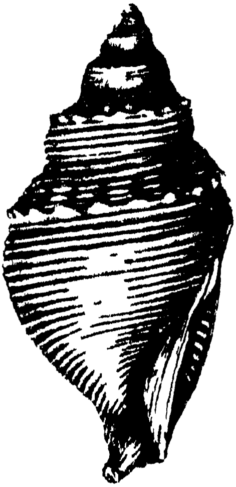

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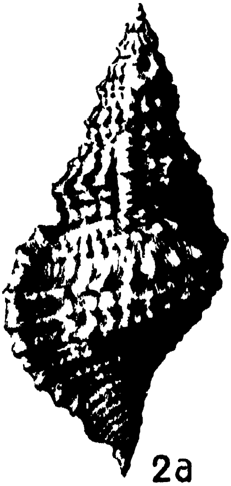

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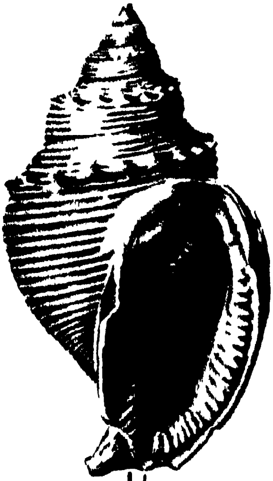

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E. A. Talbot del.

New Pliocene Gastropods from Cyprus.

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XXXII.—Timanthes *Stål and* Pirmeda, *gen. nov.* (*Orthoptera*, Tettigoniidæ). By G. M. Henry, Assistant in Systematic Entomology, Colombo Museum.

[Plate X.]

Having before me the type of *Timanthes signatipennis* Stål (genotype of *Timanthes* Stal), kindly loaned by the Stockholm Museum, I am able to state with no doubt at all that Brunner (1895, p. 65) was wrong in placing *T. signatipennis* Stål as a synonym of *Locusta* (*Aprion*) *lobifolia* De Haan (under the name *Timanthes lobifolius* De Haan); both De Haan's and Brunner's figures represent an insect with tegmina and wings of quite different shape to those of Stal's type ♂, as may be seen by comparing their figures with the photograph of the latter given by Sjöstedt (1933, pl. 7, f. 4). I suspect that the two species are not even congeneric, but as this can only be ascertained by comparison of the respective types, I refrain from renaming Brunner's *Timanthes*; it is to be hoped that this question will be settled by some orthopterist in a position to examine De Haan's and Brunner's specimens. To prevent further confusion I offer the following redescription.

Subfamily *Pseudophyllinæ*.

Tribe PHYLLOMIMI.

TIMANTHES Stål.

♂. Size small; form slender; colour yellow (? green in life). Head elongate-conical, somewhat flattened, face very reclinate. Fastigium of vertex long, acute, weakly sulcate, little surpassing antennal scrobes. Basal antennal segment long and stout. Eyes globose and prominent. Pronotum wider than long, transversely rounded, not at all medially carinate; front margin rounded, hind margin broadly rounded, lateral lobes sloping, their ventral margin tuberculate; with two deep and wide transverse sulci, of which the posterior is behind the middle; surface tuberculate. Tegmina rather broad, widest behind the middle, broadly rounded at apex, with well-developed proximal costal lobe; costal margin evenly curved; texture of tegmina coriaceous and opaque; micro-venation sparse. Vein *Sc* near base somewhat bowed away from *R*, returning to it and thereafter gradually diverging; *Rs* leaving *R* before middle, obtuse-angulated near base, thereafter nearly straight to apex of tegmen; *M* 1 and *M* 2 (anterior and posterior ulnar) running straight and parallel with *Rs*. Stridulatory area of tegmina well, but not abnormally, developed; right tegmen with a hyaline mirror. Wings abbreviated, with few vannal veins, hyaline throughout.

Prosternum unarmed. Mesosternum quadrate, transverse, its margins finely crenulate. Metasternum wider, but shorter, than mesosternum.

Limbs long and slender. All genicular lobes rounded. Fore femur very long, nearly cylindrical, ventral carinæ unarmed, other carinæ indicated only by rows of micro-setæ. Mid-femur with anterior ventral carina well developed and armed with a few minute teeth; otherwise like fore femur. Hind femur long and slender, with carinæ obsolescent except outer ventral, which is sub-laminate, armed with sparse, small teeth. Fore tibia long, nearly square in section; auditory organs strongly bullate on both sides. Mid-tibia slightly compressed. Hind tibia feebly compressed, with ventral carinæ sparsely, dorsal carinæ very sparsely, armed with minute teeth.

Male anal tergite emarginate; supra-anal plate flat, ovate; cerci simple, cylindrical, incurved, apically hooked; subgenital lamina medially produced; styles large.

Timanthes signatipennis Stål.

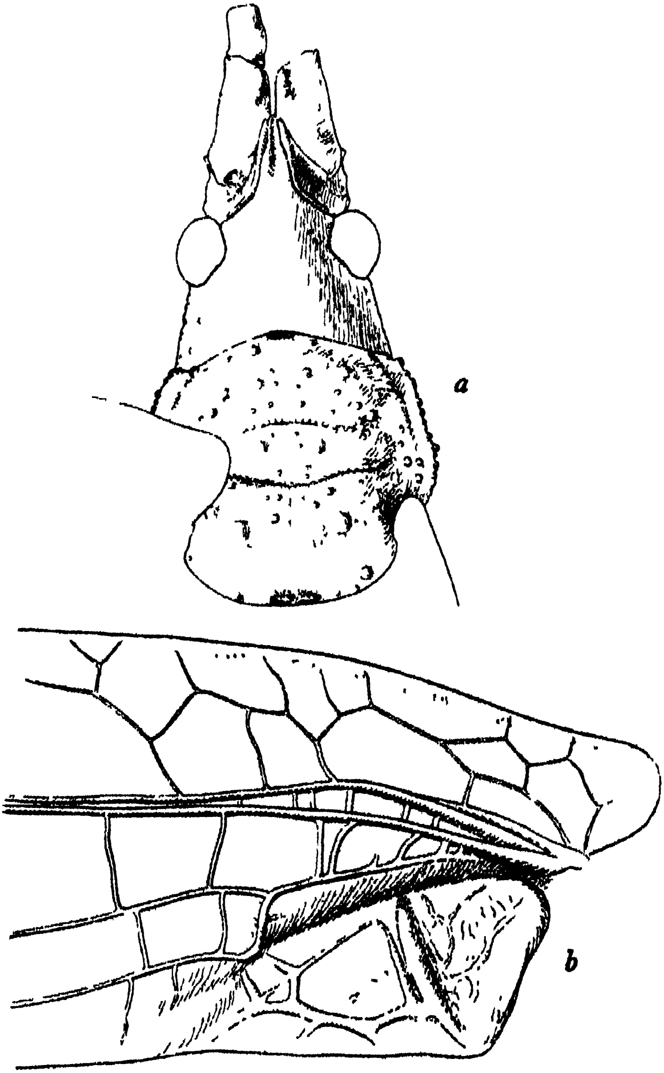
Basal antennal segment uneven in surface, with a short, dorso-internal, tuberculate ridge; outer, distal margin feebly toothed. Second segment stout, annulately grooved on inner side about the middle. Flagellum broken off in type, probably stout. Sides of head behind eye callously ridged; face and sides of head with a few scattered granules Clypeus narrow, transversely tumescent. Pronotum with opaque tubercles of various sizes, irregularly scattered. Tegmina of much the same general shape as those of *Pirmeda* spp. (see fig. 4), but widest at about 0·6 of their length from base (their shape and general venation can be seen in Sjöstedt's figure abovementioned), texture peculiar—leathery and opaque except between *Sc* and *R* and in the stridulatory areas, where it is more or less hyaline. Wings similar in general shape to those of *Pirmeda rosetta*, but much shorter relatively to the tegmina and differing in details of venation.

Coloration. The type is dull lemon-yellow, with the following brown markings: interno-dorsal ridge on basal antennal segment; dorsal margins of scrobes; middle of fore and hind margins of pronotum; row of tubercles on ventral margins of lateral lobes; a submarginal row of spots on costal and apical margins of tegmen; three large, more or less annular markings in a longitudinal row on disk of tegmen; distal end of fore and mid-femora; auditory bullæ; and all tarsi. A band on lower margin of lateral lobes of pronotum is opaque, brownish white.

Measurements (in mm.): –

	♂.
Length of body	**21.0**
Length of face, fastigium—apex of labrum	**7·0**
Width of face	**4·0**
Width of head across eyes	**3·7**
Length of pronotum	**4·8**
Width of pronotum	**5·3**
Length of tegmen	**23·0**
Width of tegmen	**8·3**
Length of wing	**17·5**
Length of fore femur	**7·7**
Length of fore tibia	**8·2**
Length of hind femur	**14·0**
Length of hind tibia	**13·4**

Fig. 1.



Timanthes signatipennis Stål, ♂ type.

a. Head and pronotum, × 7. *b*. Base of left tegmen, × 7.

The specimen bears the following labels: (1) "Ins. Philipp.," (2) "Semper," (3) "Typus," (4) "*Timanthes signatipennis* Stål," (5) "172."

PIRMEDA, gen. nov.

Size small; coloration pale green, more or less spotted with black.

Head conical, reclinate, smooth. Fastigium of vertex pointed, medially sulcate, not surpassing antennal scrobes. Antennæ very long, their first segment broad, slightly flattened. Eyes large and prominent.

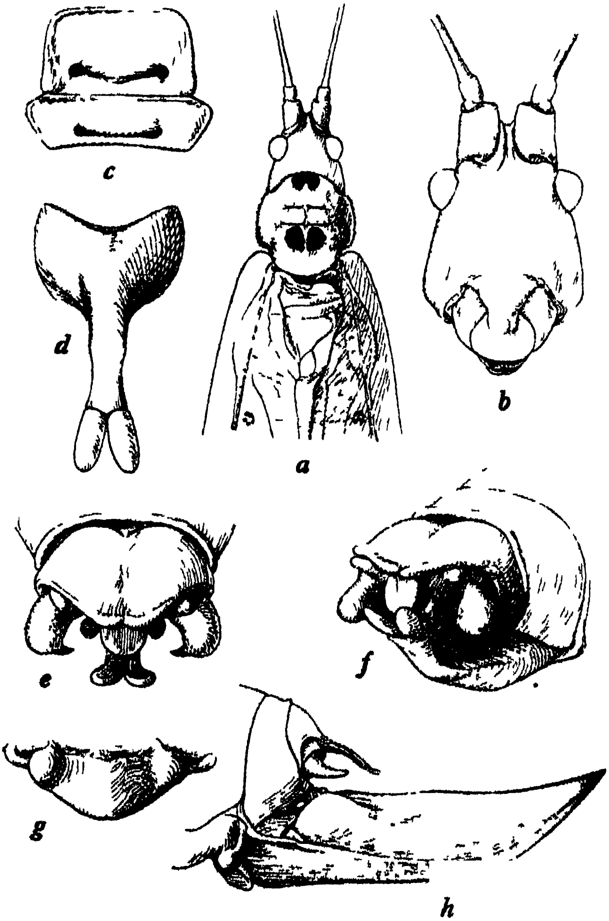
Pronotum nearly or quite as broad as long, rounded from side to side, front and hind margins rounded; with two deep transverse sulci, of which the posterior is at, or very near, the middle; lateral lobes sloping, their margins crenulated; surface of pronotum sparsely granulated. Prosternum unarmed; mesosternum transverse, its margins smooth; metasternum wider, but shorter than the mesosternum.

Tegmina broad, rounded at tip, costal margin only feebly lobate at base; their texture finely coriaceous, not hyaline between veinules, which are very sparse. In the male vein *Sc* is thickened at the base and strongly bowed away from *R*, to which it returns distal to the stridulatory field; in the female this feature, though discernible, is not so marked. The general character of the venation can be seen in fig. 4. Wings somewhat shorter than tegmina, with few vannal veins, abortive.

Fore coxa with a cylindrical spine. Fore femur with five carinæ (one dorsal, two ventral, two externo-lateral), the two ventral armed with small, oblique spines. Mid-femur with three or four carinæ (one dorsal, one or two ventral, one lateral); the outer ventral armed with small, oblique spines. Hind femur with inner dorsal carina very well developed in the proximal half; outer dorsal obsolete proximally, distinct distally; inner ventral feeble, but distinct, outer ventral very well developed, especially distally, where it is laminately produced; it is armed with a number of sloping spines; outer face of hind femur deeply sulcate longitudinally.

All genicular lobes unarmed, more or less rounded. Fore tibia almost square in section, unarmed except for a pair of minute, apical, ventral spurs, its auditory organs bullate on both sides. Mid-tibia similar to fore tibia, but somewhat obliquely compressed and widened proximally, and with outer dorsal carina rounded and obsolescent; unarmed except for a pair of minute, apical, ventral spurs.

Fig. 2.



Pirmeda tenmalaia, sp. n.

a. ♂, fore part of body, ×3; *b*. ♂, face, ×6; *c*. ♀, sternal plate, ×6; *d*. ♂, subgenital lamina, ×10; *e*, ♂, genitalia, dorsal, ×10; *f*. ♂, genitalia, postero-lateral, ×10; *g*. ♀, subgenital lamina, ×10; *h*. ♀, ovipositor, ×6.

Hind tibia quadrangular in section, slightly expanded dorso-ventrally in the proximal part; both dorsal carinæ armed with numerous minute oblique spines; ventral inner carina unarmed, ventral outer carina with, at most, one or two minute spines; no dorsal apical spines, but one small ventral spur on each side.

Male tenth tergite truncate or medially lobate. Supra-anal plate oval, thin, attached to ventral surface of tenth tergite somewhat proximal to the margin. Male cerci more or less incurved with a small, apical, incurved hook. Male subgenital lamina transverse and convex at base, narrowing distally into a more or less cylindrical, recurved process, bearing large, elliptical styles at the apex.

Ovipositor (in the only female known) feebly curved, acute. Female subgenital lamina transverse.

Genotype: *Pirmeda tenmalaia*, sp. n.

This new genus belongs to the Subfamily Pseudophyllinæ, and in Brunner's key (1895, p. 9) it runs to a position intermediate between the sections Pseudophylli and Phyllomimi. It appears on the whole, however, to be nearest to *Timanthes* Stål, differing from it in the much shorter head and fastigium; shorter first antennal segment; poorly developed costal lobe of tegmen; shorter limbs; femoral carinæ much better developed; smooth margins of mesosternum; texture of tegmina; and in details of limb armature, etc.

Pirmeda tenmalaia, sp. n. (Pl. X.)

Antennæ very long (up to nearly five times the body length in male, about four times the body length, excluding ovipositor, in female), annulated with dark brown, sparsely in proximal half, thereafter more abundantly. Fastigium of vertex not quite reaching anterior margins of antennal scrobes. Eyes large and prominent, broadly elliptical in side view. Pronotum shaped as shown in fig. 2, *a*, its front margin minutely tuberculate, lower margin of lateral lobes strongly tuberculate, surface of pronotum studded with scattered tubercles, which are sparse or absent on the lower part of lateral lobes, sides of mesozona, and hind part of metazona. Two transverse sulci, which are long and deep, especially the posterior; they are connected in the middle line by a broad, shallow sulcus. The metazona has a shallow, transverse concavity across it, connecting the humeral bays.

Shape, structure, and venation of male left tegmen is shown in fig. 4, *a*. In the male right tegmen the mirror is roughly triangular, greenish milky in appearance. Female venation similar to that of male except that it lacks the stridulatory specialization, and vein *Sc* is not abnormally bowed away from *R* near the base. Wings in both sexes rather poorly developed, colourless hyaline, anal lobe with its area and number of vannal veins much reduced (the latter only about five in number); shape of wing almost a half-circle, the costal margin representing the diameter; tip rounded.

Sternal plate as shown in fig. 2, *c*. This represents the female condition, but the male is similar; margins smooth.

Limbs.—Fore femur with 3–5 very small, oblique spines on anterior ventral carina, 0–4 very minute ones on posterior; mid-femur with 5–8 spines, largest distally, on anterior ventral carina, none on posterior ventral, which is obsolescent; hind femur with 10–14 spines, situated mainly on distal half of outer ventral carina, none on inner. All carinæ on femora and tibiæ pilose.

Genitalia.—Male: tenth tergite transverse, rounded, produced into a median lobe which may be either excised or rounded at the apex (the specimens before me show considerable variation in this respect); in either case the margin is thickened and slightly recurved. Supra-anal plate oval, attached to lower surface of tenth tergite, proximal to hind margin. Cerci have a broad base, with a strong posterior tubercle, attached to ventral surface of tenth tergite; from this base the short, cylindrical cercus projects downward, curving in the manner shown in fig. 2, *e*, *f*; its apex is bluntly rounded, with a short, sclerotized hook projecting inwards. Subgenital lamina shaped as shown in fig. 2, *d*, *f*; the cylindrical posterior process is carinate on the sides, more or less curving upwards. Styles large and elliptical. Cerci, subgenital lamina, and styles are densely pubescent (this pubescence is omitted from the figures for the sake of clearness).

Female.—Tenth tergite rounded concavely arched above bases of cerci, briefly truncate or rounded-truncate at the lobately-produced apex, with the flat, oval supra-anal plate projecting from below the truncate margin. Cerci short, cylindrical, slightly recurved, with a small sclerotized hook on inner side at apex. Ovipositor and subgenital lamina as shown in fig. 2, *g*, *h*.

Coloration.—In general light translucent green, with tegmina finely mottled, in a chequered pattern, with richer green; costal margin of tegmina narrowly crimson, with a narrow, inner border of chrome-yellow, these colours fading out distally. On the pronotum there are two deep black marks of the shape and position shown in fig. 2, *a*; the immediate neighbourhood of these marks is chrome-yellow. In the tegmina the centre of each areole has a black spot; a row of areoles in the middle of the tegmen comprising those between *R* and *Rs*, and one proximal to the junction of those veins, in the same line, between *Rs* and *M*, has larger grouped spots, forming a conspicuous series as shown in fig. 4, *a*. The above description of black markings holds good for the majority of specimens, but the series before me shows a wide range of variation in the development of these markings; on the one hand, some specimens show only faint traces of the pronotal markings, and the tegminal spots much reduced, while on the other, a few of the males have the pronotal marks very much larger and connected by a pair of spots on the mesozona; such specimens may have a number of supernumerary dark flecks on the tegmina. The black markings in females tend to be smaller and less dense than in males. In addition to the black spots there is a variable tendency towards the development of chrome-yellow spots on the tegmina; one female before me, in particular, shows large yellow blotches arranged in several series, each blotch being situated on a main cross-vein (*i. e.*, alternating with the black spots, which are situated on subsidiary, or incomplete, cross-veins).

Legs unicolorous pale green; ovipositor translucent greenish, with chestnut distal margins and apex.

Measurements (in mm.):—

	♂♂.	♀♀.
Length of body	20·0 – 22·0	22·0–23·0
Length of antenna, *ca.*	90·0 –105·0	85·0–90·0
Width of head across eyes	3·25– 3·3	3·3– 3·5
Length of pronotum	4·25– 4·75	4·3– 5·0
Width of pronotum	4·1 – 4·6	4·4– 4·6
Length of tegmen	18·5 – 20·0	22·0–25·0
Width of tegmen at middle ...	6·0 – 6·7	7·0– 7·6
Length of fore femur	5·0 – 5·4	5·2– 5·8
Length of hind femur	10·0 – 11·0	11·0–12·0
Length of ovipositor	....	8·0– 9·0

Material examined.—Fourteen males and eighteen females, all captured by the British Museum–Colombo Museum Expeditions to South India, at Tenmalai, Travancore, 500–800 feet, in May 1937 and October 1938. Half the specimens, including the type (a ♂ captured 11–17.x.1938), are preserved in the British Museum (Natural History), the remaining paratypes belonging to the Colombo Museum, Ceylon.

Bionomics etc.—The specimens were found in jungle undergrowth in and about the garden of the Forest Circuit Bungalow at Tenmalai—a small village and Government timber depot situated among forested hills near the western end of the Shencotta gap. The species was taken abundantly, especially in October. During the day specimens were found flattened on the lower surfaces of leaves, but most were captured at night with the aid of a powerful lamp. A number were kept alive for several months in my laboratory in Colombo, where they fed on petals of flowers, such as *Osbeckia*, *Hibiscus*, etc. Eggs were laid prolifically, inserted in slits cut by the ovipositor in tender stems, buds, young fruits, etc. of *Osbeckia*. There is, however, no reason to suppose that this plant is specially favoured, either as food or as a nursery for the eggs, by the species in a state of nature.

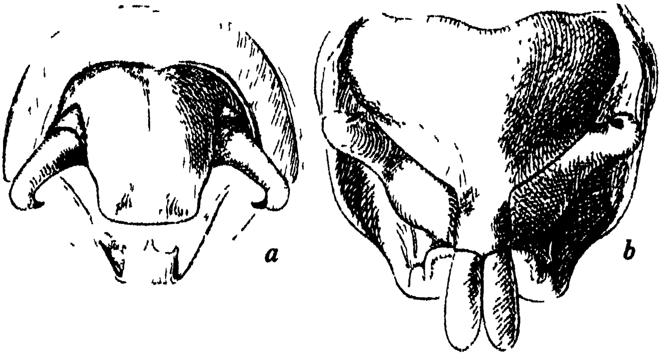
Pirmeda travancora, sp. n.

Similar to *P. tenmalaia* in size, shape of head, structure of antennæ, general shape and structure of pronotum, shape and venation of tegmina, structure of meso- and metasterna, structure and armature of limbs; differing from the genotype in the following features: antennæ shorter, less than four body-lengths in the male, annulated with dark brown only at their distal ends; basal joint slightly broader. Fastigium of vertex broader. Pronotum without black markings. Tegmina with only very small black spots in the areoles. Wings less developed, about two-thirds the tegminal length.

Genitalia.—Tenth tergite rounded from side to side, deeply medially sulcate, produced into a large, strongly decurved median lobe which is rounded-truncate at the apex; supra-anal plate completely concealed, in the unique type, by the bases of cerci; the latter, arising from large bases attached to lower surface of tenth tergite, curve forwards, downwards, and outwards, ending in a rounded tip, with a strong, inwardly-directed, sclerotized hook. Subgenital lamina very broad, transverse and rounded at base, produced medially into a short cylinder which bears two large elliptical styles; the median projection meets the body of the organ at an obtuse angle, the laminate sides of the base forming an acute angle at their junction with the cylinder.

Coloration.—In life green, but the only specimen has faded to ochreous yellow. There are small black spots on the tegmina in the same positions as those of the genotype, but much smaller than in any of the available specimens of the latter. There are rows of chrome-yellow, opaque spots in the areoles between *R* (with *Rs*) and *M* as in some specimens of *P. tenmalaia*.

Fig. 3.



Pirmeda travancora, sp. n., ♂ genitalia.
a. Posterior (styles omitted). *b*. Ventral.

Measurements (in mm.):—

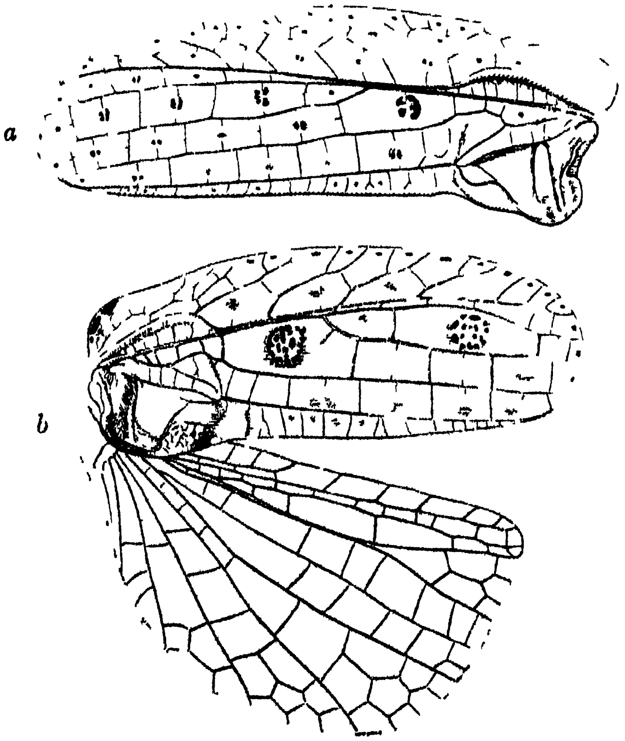
	♂.
Length of body, *ca.*	22·0
Length of antenna (since broken), *ca.*	75·0
Width of head across eyes	3·1
Length of pronotum	4·9
Width of pronotum	4·4
Length of tegmen	22·0
Width of tegmen at middle	7·5
Length of fore femur	5·5
Length of hind femur	10·0

Material examined.—The unique type, a male, was captured by the British Museum-Colombo Museum Expedition to South India in jungle undergrowth at Pirmed, 3400 feet, in Travancore, 4 6. v. 1937; it is in the British Museum

Pirmeda rosetta, sp n

Closely resembles the genotype, *P. tenmalaia*, in structure of head, antenna, pronotum, tegmen and wing, sternum, limbs, and in general size and appearance.

Fig 4



a. Pirmeda tenmalaia, sp. n., ♂ left tegmen, × 4.
b Pirmeda rosetta, sp. n., ♂ right tegmen and wing, × 4.

Antennæ annulated with dense black at approximately the following segments :—3, 6, 9, 16, 26, 33, 41; beyond this point the main annulæ tend to become paler and further apart, while secondary annulæ appear between them. Pronotum with two black marks in the same position as those of *P. tenmalaia*, but they are transversely elliptical, with large spots of the ground-colour in their centres. Dorsal field of pronotum in a large patch, narrowest between the two transverse sulci, widest in the metazona, is of a different ground-colour from the rest of the pronotum, and was probably opaque chrome-yellow in life; now opaque yellow-ochre.

Tegmina, although very similar to those of the genotype in venation, are relatively shorter and broader; with a deep black macular mark on the margin of costal lobe; a submarginal row of black spots in the costal and terminal areoles, commencing at the proximal third; rose-pink blotches in most of the areoles, in the positions occupied by black spots in *P. tenmalaia*; the following areoles have large discal "rosettes" of black spots surrounded by rose-pink: -(1) the areole between *R* and *M*, proximal to the branching-off of *Rs*; (2) the first and second areoles between *R* and *Rs* (in the type the middle rosette of the series on the right tegmen is absent; see fig. 4, *b*; it is probable that these markings are variable).

Sternal plate resembling that of *P. tenmalaia* in its main features, but the mesosternal plate is relatively wider in relation to its length (twice as broad as long), and its anterior angles are scarcely rounded.

Limbs.—These agree in structure and armature with those of *P. tenmalaia.* All tibiæ have a dark brown spot at the distal end; the third segment of all tarsi, with its pulvilli, is dark brown.

Genitalia.—The only available specimen being somewhat teneral these have shrunken to some extent, and no drawing is therefore given of them. Anal tergite transverse, its margin concave around bases of cerci, the middle not at all produced as in the two above-described species, but truncate-emarginate; supra-anal plate ovate, attached to anal tergite on its ventral surface, a short distance proximal to the margin. Cerci cylindrical, strongly incurving, globose at tips, with an inwardly-directed hook; relatively longer than in *P. tenmalaia*, shorter and stouter than in *P. travancora.* Subgenital lamina with a transverse basal portion which, in the type, is strongly contracted laterally into the shape of a ship's prow; this is probably due to post-mortem shrinkage. The median projection is short, probably cylindrical in life, but flattened through shrinkage: the styles, also much shrivelled, are long and narrow. Cerci, subgenital lamina, and styles are densely pilose as in the other two species described in this paper.

Coloration.—In life green, but now yellow-ochre, with the antennal, pronotal, tegminal, and tibial markings already described.

Measurements (in mm.):-

	♂.
Length of body, *ca.*	15·0
Length of antenna	70+(broken)
Width of head across eyes	3·2
Length of pronotum	4·0
Width of pronotum	4·0
Length of tegmen	17·3
Width of tegmen at middle	6·5
Length of fore femur	5·0
Length of hind femur	9·5

Material examined.—The type ♂, Bolampatti Valley (between Siruvani, 1700 feet, and Muthikolam, 3000 feet), in the Coimbatore District, South India, 20. iv. 1937. It was taken by the second of the British Museum–Colombo Museum Expeditions to South India, and is preserved in the British Museum (Natural History). The specimen was found in forest undergrowth.

ACKNOWLEDGMENTS.

My grateful thanks are due to Dr. B. P. Uvarov for help in the preparation of this paper, and to Dr. Kjell Ander, of the Stockholm Museum, for lending the type of *Timanthes signatipennis* Stål.

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EXPLANATION OF PLATE X.

Pirmeda tenmalaia, sp. n., ♂ and ♀ (living specimens).

XXXIII.—*Three Species of Amphipoda* (*Crustacea*) *new to Britain.*

By D. M. Reid, Department of Biology, Harrow School.

Of the three species of Amphipoda to be recorded two belong to the family Gammaridæ and are quite common on the continent. The other is a member of the family Talitridæ, and is known to range as far north as Concarneau in France.

Gammaridæ

Gammarus olivii M.-Edw.—Several individuals of this species were taken by Mr. C. B. Goodhart in the River Afon water at Keyhaven in Hampshire. The water in which they were living was only slightly brackish At high tide the maximum salinity was less than 3 per cent. while the minimum was about 0·6 per cent., but at low tide the animals were living in purely fresh water.

According to Chevreux and Fage (1925) *G. olivii* occurs commonly in the étangs or ponds on various parts of the coasts of France. These étangs are in the nature of lagoons, separated from the sea by a sea-wall with a small opening. They are supplied with fresh water by various streams or rivers. I have not been able to get any information about their salinity, but suppose that they must contain a fair proportion of fresh water. It is assumed then that the habitats in the French and Mediterranean localities from which *G. olivii* has been taken are also brackish.

The present specimens do not exactly fit the description given by Chevreux and Fage, nor do they compare exactly with the continental specimens in the British Museum (Natural History). The differences, however, are not greater than might be accounted for by individual variation.

Chevreux and Fage.	Keyhaven specimens.
1st antenna of male just longer than 2nd, and 1st joint of the peduncle less than 2nd and 3rd together.	1st just shorter than 2nd; 1st equal to the 2nd and 3rd together.
Bristles on the posterior edge of 3rd epimeral plate.	Usually without bristles.

I am afraid I cannot agree with the views expressed by my friend Mr. E. Dahl (1937) and others, that this species is a mere variety of *G. marinus* Leach. Between the two species there are quite marked differences.

G. marinus.	*G. olivii.*
1st antenna much longer than 2nd.	About equal length.
2nd antenna without calceoles.	With calceoles.
Flagellum of male 2nd antenna normal.	Heavy brush of bristles on the inner side, like *G. pulex*.
Inner branch of 3rd uropod ¾ outer.	Inner only ⅓ outer.

G. olivii is undoubtedly a southern species recorded most frequently from the Mediterranean, though it is known to range out into the Atlantic and is found on the Canary Islands.

Gammarus lacustris G. O. Sars.—I have taken specimens of this species from fresh water lochs in Assynt, Sutherland. They are fairly abundant in Loch Beannachd Beg, but less plentiful in adjacent lochs.

It is interesting to note that the trout in L. Beannachd Beg are in good condition earlier in the season than are those in the lochs in the same district which do not contain this amphipod. This is probably due to the amphipod acting as a source of winter food. Therefore, unlike the fish in the other lochs, they do not pass through an annual stage of semi-starvation.

G. lacustris appears to be common in at least one loch of a very alkaline nature near Thurso, in Caithness. It is probably quite common in the north, but has been recorded as *G. pulex*.

Since there is no description of this species in English, perhaps it would not be out of place to draw attention to its most characteristic points.

In general it resembles *G. pulex*, but differs from it in that the flagellum of the 2nd antenna of the male is not thickened, nor does it possess the heavy brush of bristles which is characteristic of the male *pulex*. In *pulex* the 2nd epimeral plate has a square-cut postero-distal angle, whereas that of *lacustris* is continued into a point. The posterior border of the 3rd and 4th pereiopods have straight bristles. The posterior border of the basal joint of the 7th pereiopod is straight. The inner branch of the 3rd uropod is long and both branches are heavily supplied with branched bristles. The spines on the urosome are usually small and not set in large groups.

The specimens in my possession approach in form most closely to those described by Schellenberg (1937) from Plön. They have only a few spines and bristles on the 2nd epimeral plate, and the telson has only two terminal spines and one lateral spine and very few bristles on each half.

This species is known to inhabit fresh water lakes of Norway, Sweden, Denmark, and Germany.

Talitridæ.

Hyale perieri (Lucas).—Amongst a collection of amphipods from north Cornwall sent me by Mr. M. G. Barrett there were three males of this species. They occurred on weed in intertidal rock-pools—that is, in the same type of locality in which I have found the species on the shores of Madeira.

There is nothing surprising in their being found in the southern area of England, since they are known to range as far north as Concarneau on the coast of France, eastwards as far as the Adriatic, southwards to the Belgian Congo, and eastwards to Bermuda and the coasts of the United States.

The specimens from Cornwall were perfectly normal.

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SCHELLENBERG, A. 1937. Zool. Jahrbuch, lxix. 5–6, p. 469.

XXXIV.—*Insects of the Lake Rudolf Rift Valley Expedition*, 1934.—2. *Coleoptera*. By D. R. BUXTON.

THIS paper practically completes the insect material of the Lake Rudolf Rift Valley Expedition, and no more lists are likely to be published. The following papers on the zoological results of the Expedition have already appeared :—

D. R. Buxton. "Insects of the Lake Rudolf Rift Valley Expedition, 1934.—1. Orders other than Coleoptera." Ann. & Mag. Nat. Hist. (10) xx., December 1937. (All except Acrididæ, Mantidæ, Coleoptera.)

B. P. Uvarov. 'Mission Scientifique de l'Omo,' tome iv. fascicule 35. Paris, Muséum National d'Histoire Naturelle. (Acrididæ, together with those of other expeditions.)

H. Beier. "Mantodea from the Lake Rudolf Rift Valley Expedition, 1934." Ann. & Mag. Nat. Hist. (10) xix., March 1937. (Mantidæ.)

H. W. Parker. "Reptiles and Amphibians collected by the Lake Rudolf Rift Valley Expedition, 1934." Ann. & Mag. Nat. Hist. (10) xviii., December 1936.

D. R. Buxton. "A Natural History of the Turkana Fauna." 'Journal of the East Africa and Uganda Natural History Society.' vol. xiii. nos. 3–4. (A general illustrated account.)

The services of the British Museum staff in identifying these collections are again gratefully acknowledged.

Cicindelidæ. (E. B. Britton.)

Megacephala regalis Boh. var. *hauseri* W. Horn.	Uganda, Kenya.
Cicindela brevicollis Wied. var. *intermediola* W. Horn.	E. Africa from S. Abyssinia to Natal.
—— *dongalensis* Klug var. *abyssinica* W. Horn.	Egypt to Abyssinia, Sudan and Senegal.
—— *nilotica* Dejean	Africa N. of Delagoa Bay except Marocco to Tripoli.
—— *alboguttata* Klug	Eritrea, Abyssinia, Somaliland, S.W. Arabia.
—— *melancholica* F.	All Africa, Persia to N. India, S. Europe and Mediterranean islands.

Carabidæ. (E. B. Britton.)

Calosoma planicolle Chaudoir	E. Africa.
—— *senegalense* Dejean	E. and W. Africa, Abyssinia.
—— *maderæ* F. var. *rugosum* Degeer	S. Africa to Sudan.
Scarites nitidulus Klug	E. Africa.
—— sp.	
Omophron multiguttatus Chaudoir, var.	Egypt, Sudan.
Anthia hexasticta Gerst.	E. Africa.
Graphopterus obsoletus Ol.	N. Nigeria, Sudan, Uganda.
Polyhirma quadriplagiata Gerst.	E. Africa.
Cymbionotum sp.	
Galerita angustipennis Gerst.	E. Africa.
Abacetus æthiops Straneo	Abyssinia, Uganda.
Parastrigia melanaria Klug	E. Africa.
Ooidius dorsiger Klug	E. Africa, Transvaal, S.W. Africa, Madagascar.

Orthogonius sp.
Chlænius spp.
Tachys spp.
Bembidion sp.

Glycia ornata Klug	Spain to N. India, Arabia, Egypt to Eritrea and Somaliland.
Pheropsophus insignis Boheman	E. Africa.
Brachynus apicalis Er. var. *adamsoni* Alluaud.	Uganda.

Paussidæ. (A. Reichensperger.)

Paussus spinicola Wasm.
—— *adnexus* Reichensp.

Dytiscidæ. (J. Balfour-Browne.)

Bidessus africanus Rég.	East Africa.
Eretes sticticus Linn.	Warmer regions except Australia.
Cybister alluaudi Guign.	Kenya.
—— *geschwendtneri* Guign.	Tropical Africa.
—— *tripunctatus* subsp. *africanus* Cast.	Africa, S. Europe, adjacent islands.

Gyrinidæ. (J. Balfour-Browne.)

Dineutes grossus Modeer	Africa.
—— *æreus* Klug	Africa.
—— *subspinosus* Klug	All Africa and Arabia.

Hydrophilidæ. (J. Balfour-Browne.)

Cœlostoma (aber.) *horni* Rég.	India, Ceylon, Mauritius, Mozambique, West Africa.
Helochares (*Hydrobaticus*) *crispus* d'Orch.	East Africa.
—— *turkana*, sp. n.	
Berosus (*Enopleurus*) *furcatus* Boh.	East to South Africa, Egypt.
—— (s. str.) *vitticollis* Boh.	S. Africa to Rhodesia and Angola.
—— (s. str.) sp. indet.	

Staphylinidæ. (M. Bernhauer.)

Bledius ugandæ, sp. n. (*infra*).

Heteroceridæ. (R. Mamitza.)

Heterocerus abyssinicus	Abyssinia.
—— (*Littorimus*) *convexiusculus*, sp. n. (*infra*).	

Cucujidæ. (H. Scott.)

Hectarthrum sp. (prob. *murrayi* Grouvelle).	W. and E. Tropical Africa.
—— sp. resembling *quadrilineatum* Smith.	W. and E. Tropical Africa.
—— sp. (other specimens in B.M. from East Africa).	
—— sp.	

Temnochilidæ (Trogositidæ). (H. Scott.)

Melambia sp. resembling *opaca* Reitt.	S. Africa.
Gymnochila lepidoptera Reitter	Abyssinia.

Colydiidæ. (H. Scott.)

Bothrideres confossicollis Fairm.	Abyssinia, E. Africa.

Mycetophagidæ. (H. Scott.)

Typhæa stercorea L. (*fumata* L.)	Cosmopolitan.

Phalacridæ. (H. Scott.)

Two species representing two genera, one possibly *Stilbus* sp.

Nitidulidæ. (H. Scott.)

Amphicrossus sp. not in B.M.

Coccinellidæ. (H. Scott.)

Cydonia aurora Gerst.	E. Africa.
—— *lunata* F.	Egypt, all Africa S. of Sahara, Madagascar, etc.
Epilachna hirta Thunb., including one var. with black markings much reduced.	Africa S. of Sahara to Cape.
—— sp. possibly *fulvosignata* Reiche	Africa S. of Sahara.
Exochomus sp. resembling *pubescens* Küst. but not identical.	

Histeridæ. (H. Scott.)

Teretrius sp. probably *prædator* Lewis	Central Africa to Senegal.
Hister, 3 spp.	

Tenebrionidæ. (K. G. Blair.)

Erodiinæ :

Arthrodibius major Lesne	Kenya.
Diodontes sp. (? *chatanayi* Lesne).	

Epitraginæ :

Curimosphena mülleri Haag (*pavesii* Gestro).	Somaliland and B. E. Africa.
—— *eclavatus* Lesne	Abyssinia and B. E. Africa.
—— *trivialis* Gerst.	B. E. Africa.
—— sp.	L. Rudolf (*Worthington*).

Zophosinæ :

Zophosis congesta Gerst.	Kenya.
—— sp. (*sculptilis* Gerst., or near).	
—— *bouvieri* Chat.	L. Rudolf, Italian Somaliland.
—— *plicatipennis* Deyr. var. *rodolphi* Chat.	Somaliland, Kenya.
—— *sulcata* Deyr.	Kenya.

Tentyriinæ :

Homalopsis prosternalis Lesne	N. of L. Rudolf.
Rhytinota prælonga Reiche	Egypt, Abyssinia, Somaliland, Uganda, etc.
—— *stupida* Gerst.	Somaliland, Kenya, Uganda.

Adesmiinæ :

Adesmia (*Macropoda*) sp. not in B.M.

Eurychorinæ :

Peristeptus sp. (? *gestroi* Haag var.)	B. E. Africa.
Gen. near *Herpsis* Haag.	

Stenosinæ :

Stenosis sp. near *seriepilosa* Fairm.

Molurinæ :	
Phrynocolus placidus Kolbe	Sudan, Lake Baringo.
—— *crispatus* Fairm.	Kenya.
—— *discoideus* Fairm.	Uganda.
Psammodes (*Psammophanes*) sp. near *terrenus* Lesne.	
Sepidiinæ :	
Vieta robusta Lesne	Kenya, L. Rudolf.
—— *angustula* Lesne	Kenya, S. of L. Rudolf.
Pimeliinæ :	
Pimelia hildebrandti Har.	Kenya, L. Rudolf.
Pedininæ :	
Mesomorphus murinus Baudi	Egypt to Transvaal.
Opatrinæ :	
Gonocephalum simplex F.	Africa.
—— *contractum* Gerst.	E. Africa.
—— *alticola* Chat. (?)	E. Africa.
——, 2 spp.	
Scleropatrum sp. (?) new to B.M.	
Gen. near *Opatropis* new to B.M.	
Cædius latipes Muls.	W. Africa, Uganda.
—— sp.	
Anemia convexa Gestro	Zanzibar.
—— sp.	
Ulominæ :	
Eutochia pulla Er.	Africa.
Alphitobius diaperinus Panz.	Cosmopolitan, with commerce.
—— *viator* Mars.	Upper Nile, Abyssinia, Tanganyika, W. Africa.
Tenebrioninæ :	
Tenebrio gigantea Geb.	E. Africa.
—— *carbo* Fairm.	Upper Nile, Abyssinia, Italian Somaliland.
Helopininæ :	
Micrantereus femoratus Gerst.	E. Africa.
—— sp.	
Oncosoma ertli Geb.	E. Africa.
—— sp.	
Helopinus cœlatus Gerst.	E. Africa.
Amarygminæ :	
Eupezus brevicollis Har.	W. Africa, Uganda, Kenya.
Dichotymus striatipennis Fairm.	E. Africa.
—— sp.	
Strongyliinæ :	
Praeugena sp. near *melanarius* (Mackl.).	
—— sp. near *festiva* Gerst.	

Meloidæ. (K. G. Blair.)

Mylabris ligata Chevr. (var.)	Abyssinia, Upper Nile, Uganda.
—— sp. (? *sennæ* Gestro var.).	
—— *tristigma* Gerst. var. *kilwana* Voigts.	E. Africa.

Mylabris hypolachna Gestro	Abyssinia, Somaliland, Kenya.
Coryna apicicornis Guér.	Sudan, Abyssinia, Kenya.
Actenodia sp. (? *unimaculata* Pic var.)	
Cyaneolytta maculifrons Maekl.	Sudan, Abyssinia, Kenya, W. Africa.
Cylindrothorax cyclops Fairm.	Kenya.
—— *telekyi* Fairm.	S. Somaliland.
Zonitoschema sp. near *pallidissima* Reitt.	

Anthicidæ. (K. G. Blair.)

Anthicus biplagiatus Laf.	Egypt and Eritrea to S. Africa.
—— *velatus* Mars.	Egypt, Sudan, Eritrea, Arabia.

Buprestidæ. (K. G. Blair.)

Sternocera castanea Oliv. var. *druryi* Waterh.	Upper Nile.
Julodis höhneli Fairm.	E. Africa.
Pseudocastalia cyaneoviridis Kraatz	E. Africa.
Acmæodera puella Boh.	Tanganyika, Rhodesia, Transvaal.
Agelia humeralis Théry	Uganda, Kenya.
Steraspis speciosa Klug	Egypt, Sahara.
—— —— var. *fastuosa* Gerst.	Sudan, Somaliland, Tanganyika.
Chalcophorella africana Thoms.	E. Africa.
Lampetis catenulata Klug	Egypt, Sudan, Abyssinia.
Anthaxia hunti Théry	Kenya.
Agrilus fryi Obenb.	Abyssinia, Sudan.
—— —— var. (or sp. aff.).	

Cerambycidæ. (K. G. Blair and S. Breuning.)

Prioninæ :

Cantharocnemis spondyloides Serv.	Egypt, Abyssinia, E. and W. Africa.
Cantharoctenus fischeri Kolbe	Tanganyika.
Acanthophorus nyansanus Kolbe	Abyssinia, E. Africa.
Tithoes confinis Laf.	Tropical Africa.
Macrotoma palmata F.	Tropical Africa.

Cerambycinæ :

Parandrœme brunnea Auriv.	Kenya.
Zamium sp. (or gen. aff.).	
Hypæschrus sp.	
Xystrocera marginalis Goldf.	Arabia, Sudan, Tanganyika, Natal.
Plocæderus benningseni Kolbe	Tanganyika.
Pachydissus sp.	
Gnatholea liturifer Walk. (*Zoodes*)	Egypt, Arabia, E. and W. Africa.
Cordylomera annulicornis Fairm.	Obock.
Ossibia fuscatum Chevr.	Africa.
—— *murina* Auriv.	Tanganyika.
Mythozoum ustulatum Thoms.	Senegal.
—— sp.	
Metobrium elegans Fairm.	Tanganyika.
—— sp.	
Compsomera speciosissima Gerst.	Mozambique.

Lamiinæ :

Idactus maculicornis Gah.	Kenya.
—— *coquereli* Fairm. (*Crossotus*)	Abyssinia.
—— *spinipennis* Gah.	Abyssinia.
Anoplostetha lactator F. var. *radiata* Gory.	Abyssinia.
Prosopocera albescens Breun.	
—— *minor* Hintz	Tanganyika.
Dinocephalus ornatus Péring.	
Pseudocharies thes fulvoplagiata Breun., sp. n.	
Chariesthes horni var. *flavescens* Breun., var. n.	
—— *gestroi* Breun.	
Ceroplesis pauli Fairm.	Somaliland, Kenya.
Titoceres jaspideus Serv.	Africa.
Crossotus ugandæ Breun., sp. n.	
—— *plumicornis* Serv.	Africa.
—— *brunneopictus* Fairm.	Somaliland.
Eunidea kristenseni Auriv.	Abyssinia, Uganda, Arabia.
—— *lineata* Auriv.	Abyssinia, Uganda.
—— *flavovittata* Breun., sp. n.	
—— *flavoapicata* Breun., sp. n.	
—— *strandi* Breun., sp. n.	
Æthiopia rotundipennis Breun., sp. n.	
Stenoroptus forticornis Breun.	Kenya.

Trogidæ. (G. J. Arrow.)

Trox incultus Boh.	Abyssinia to Cape, Madagascar.

Aphodiidæ. (G. J. Arrow and R. Paulian.)

Aphodius lividus Oliv.	Cosmopolitan.
—— *pallescens* Walk.	Egypt, Obock.
—— *discolor* Er.	Senegal.
—— *tetricus* Oliv.	Abyssinia.
—— *rutilus* Kl. v. *lesnei* Schm.	Kenya.
—— *biangulatus* Fairm.	Abyssinia.
—— *adustus* Klug	Nyasaland, Mozambique, Cape.
—— *foveiventris* Boh.	Abyssinia.
—— *pilosellus* Schm.	Obock.
Oxyomus tumulosus Schm.	Abyssinia.
Didactylia turbida Er.	
—— sp.	
Psammobius lævicollis Klug	Algeria, Abyssinia, Arabia, Syria.
Atænius gracilis Melsh.	N. and S. America.
Rhyssemus granosus Klug	N. Africa to India.
—— *rothschildi* Bend.	Kenya.
—— *coluber* Mayet	N. Africa, Arabia.

Orphnidæ. (G. J. Arrow.)

Orphnus imitator Bend.

Hybosoridæ. (G. J. Arrow.)

Hybosorus illigeri Reiche	S. Europe, Africa, India.

Geotrupidæ. (R. Paulian.)

Bolboceras buxtoni Paul., sp. n.

Copridæ. (R. Paulian and G. J. Arrow.)

Scarabæus catenatus Gerst.	Zanzibar, Abyssinia.
—— *cristatus* F.	Egypt, Arabia, Sudan.
—— sp.	
Gymnopleurus azureus F.	Africa.
—— *thalassinus* Klug	Mozambique, Natal, etc.
—— *umbrinus* Gerst.	Kenya, Senegal.
—— *lævicollis* Cast.	Kenya.
Sisyphus doriæ Har.	Abyssinia.
Catharsius inermis Cast.	S. Africa.
—— *opacus* Wat.	E. and S. Africa.
Copris amyntor Klug	E. and S. Africa.
Onthophagus arcifer d'Orb.	Abyssinia.
—— *laceratus* Gerst.	E. Africa, Congo.
—— *ebenicolor* d'Orb.	E. and S.W. Africa.
—— *carbonarius* Klug	C. and S. Africa, Arabia.
—— *sticticus* Har.	Somali, Arabia, N. Africa

Rutelidæ. (F. Ohaus.)

Anomala obscuripes Fairm.	Abyssinia, Obock.
—— *melanopa* Reitt. var. *femorata* Reitt.	Abyssinia.
—— *buxtoni* Ohaus, sp. n. (*infra*).	
—— *bottæ* Blanch.	Egypt, Sudan.
—— (*Aprosterna*) *ismaria* Ohaus.	
—— (——) *dorsata* Fahr.	Darfur to Rhodesia.
Adoretus turkanus Ohs., sp. n. (*infra*).	
—— *æniceps* Ohs., sp. n. (*infra*).	
—— *spinosus* Brenske	Galla-land.
—— *flavovittatus* Arrow	Kenya.
—— *pumilio* Burm.	Senegal.
Prodoretus guineensis Ohs.	Gold Coast.
Lepadoretus sp.	
Rhamphadoretus minutulus Brenske ...	Galla-land, Somali.

Dynastidæ. (G. J. Arrow.)

Temnorrhynchus coronatus F.	E. Africa, Eritrea and Sudan to S. Africa.

Cetoniidæ. (G. J. Arrow.)

Pseudoprotætia pilicollis Krtz.	Kenya.
Leucocelis alboguttatus Lansb.	Somali.
Proxenus squamiger Krtz.	Tanganyika.

NEW SPECIES.

Staphylinidæ. (Von Dr. MAX BERNHAUER.)

Bledius ugandæ, sp. n.

Halb so gross wie *niloticus* Er., durch die Färbung, matteren und viel dichter und dabei feiner punktierten

Halsschild und die eigenartige Auszeichnung des Kopfes des ♂ sehr ausgezeichnet.

Schwarz, die Flügeldecken mit Ausnahme der äussersten Wurzel und die Beine weissgelb, die Wurzel der bräunlichen Fühler und der Mund schmutziggelb.

♂: Kopf mit den Augen fast breiter als der Halsschild, mit je einem mässig grossen Höckerchen über der Fühlerwurzel, vor den Augen mit je einem scharfen, ziemlich langen Dorn, fast der ganzen Länge nach breit und sehr tief ausgehöhlt, die Aushöhlung durch zwei scharfe, bogige Querfurchen in drei Teile geteilt, von denen der vordere flach niedergedrückt, der mittlere etwas kissenförmig erhoben und vorn an den Seiten mit den obigen Dornen bewehrt ist, und der oberste Teil vor der Halspartie mit zwei Grübchen versehen ist. Alle drei Teile sind geglättet, der übrige Teil des Kopfes ist äusserst fein und äusserst dicht chagriniert, vollkommen matt. Halsschild etwas schmäler wie die Flügeldecken, wenig breiter als lang, gleichbreit, mit geraden Seiten und verrundeten Hinterecken, mit einer feinen, aber scharfen Längsfurche, fein und ziemlich dicht punktiert, im Grunde äusserst fein chagriniert, wenig glänzend. Flügeldecken länger als der Halsschild, deutlich länger als zusammen breit, stärker und dichter als der Halsschild punktiert, ziemlich glänzend. Hinterleib glänzend, ziemlich kräftig und weitläufig punktiert.

♀: Kopf etwas schmäler als der Halsschild, gleichmässig flach gewölbt, vor den Augen mit einer schwachen Querfurche und je einem winzigen Zähnchen in einiger Entfernung vor den Fühlerhöckerchen, diese glänzend, sonst ist die ganze Oberfläche vollkommen matt chagriniert.

Länge: 2·5 mm.

Turkana, Kenya: Kerio Rivermouth, 29. ix. 1934 (L. Rudolf Rift Valley Expedition, 1934).

Heteroceridæ. (Von Richard Mamitza.)

2. *Heterocerus* (*Littorimus*) *convexiusculus*, sp. n.

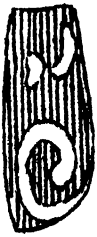
(Fig. 1.)

Länglich, etwa 2½ mal so lang als breit, gewölbt, schwach glänzend, braunschwarz bis schwarz, mit gelbroter Zeichnung der Flügeldecken.

Kopf mit den Augen etwas breiter als mit den Mandibeln lang, dicht und mässig fein punktiert, mit nach vorne gerichteten, langen gelben Haaren dicht bedeckt. Mandibeln braun, kurz und breit, auf der Innenseite nahe der abgerundeten Spitze mit zwei stumpfen Zähnen versehen, auf der Aussenseite vor der Mitte schwach eingeschnitten, der basiläre Lappen nur schwach angedeutet. Die Oberlippe ist doppelt so breit als lang, vor der Basis am breitesten, nach rückwärts schwach, nach vorne stark verengt, Vorderrand schwach aufgebogen. Antennen braun, elfgliedrig, mit siebengliedriger Keule.

Halsschild doppelt so breit als Lang, dicht und mässig fein punktiert, mit nach vorne gerichteten gelben Haaren, die an den Seiten mit langen, abstehenden Haaren untermischt sind, dicht bedeckt. Die Seiten sind fast parallel, Vorderwinkel stark abgerundet, Hinterwinkel deutlich markiert. Basis bogenförmig, bis zu den Hinterwinkeln gerandet. Der Halsschild ist bei drei von den mir zur Beschreibung vorgelegten Exemplaren braunschwarz, das vierte Stück weist jedoch eine gelbrote Längsmitte auf.

Fig. 1



Heterocerus (*Littorimus*) *convexiusculus*, sp. n.

Flügeldecken etwas mehr als 1½ mal so lang als zusammen breit, an den Seiten parallel, hinter der Schulter schwach eingedrückt, im letzten Drittel gemeinschaftlich abgerundet. Mässig stark und dicht punktiert, dazwischen fein punktuliert. Die Scheibe ist nicht gestreift. Die gelbe Behaarung ist kurz, anliegend, nach rückwärts gerichtet, mit langen, schräg abstehenden Haaren untermischt.

Die gelbrote Zeichnung der Flügeldecken besteht aus einem mit dem Seitenrand zusammenhängenden, die Schulterbeule umschliessenden Subhumeralfleck, einem Längsfleck vor der Mitte neben der Naht, einer bogenförmigen nach hinten offenen Querbinde hinter der Mitte und aus einem Fleck vor der Spitze. Der Seitenrand ist gelbrot gesäumt und reicht von der Basis bis zur Spitze. Die Naht ist fast bis zur Spitze schwarz gefärbt.

Unterseite dunkelbraun, das Abdomen ist gelbbraun. Die von der Mittelhüfte schräg gegen den Seitenrand ziehende Linie ist vorhanden. Das Prosternum und das Metasternum sind mässig fein, das Abdomen ziemlich kräftig punktiert. Die Schenkellinie des ersten Abdominalsternites vollständig, innen vom Hinterrand des Sternites zur Basis desselben bogenförmig zuruckkehrend. Die Epipleuren nahe der Basis mit einer am Innenrande beginnenden und schräg nach vorwärts zur Schulterecke verlaufenden Linie.

Beine braun, die Vorderschienen mit 9-10 Dornen bewaffnet.

Länge : 3·2–3·5 mm.

Mir lagen insgesamt vier Exemplare mit folgenden Patriaangabe zur Beschreibung vor :

Uganda : N. Turkana Prov., 11. vi. 1934.

Die Type befindet sich im British Museum, London.

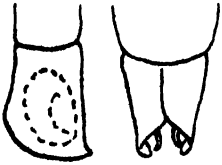
Rutelidæ. (By F. Ohaus.)

Anomala buxtoni, sp. n. (Fig. 2.)

Next allied to *A. rufina* Ohs. (Kilimandjaro). Oblong-elliptic, not broadened behind, moderately convex, upper and underside testaceous, the head, antennæ. tibiæ of the intermediate and hind legs, and all tarsi reddish brown; upper side brilliant, bare, the borders of the pygidium, abdominal sternites, metasternum, and femora with sparse reddish hairs. Clypeus parallel-sided, like the forehead, densely and somewhat roughly confluently punctured; vertex, thorax, and scutellum with fine single punctures; the basal furrow of the thorax not interrupted before the scutellum; lateral pits of thorax present. Elytra regularly striate-punctate, the punctures in the striæ somewhat transversely impressed, and over all very finely

irregularly punctate; shoulders prominent and somewhat impressed at the sides. Pygidium and underside transversely aciculate, the transverse series of bristles on the abdominal sternites not interrupted in the middle. Legs stout; anterior tibiæ bidentate; the claw-joints long and stout and toothed near the base; the greater claw of the anterior and middle feet very feebly toothed, nearly simple. The antennal club as long as the stem. Ædeagus, fig. 2.

Fig. 2.



Anomala buxtoni, sp. n.

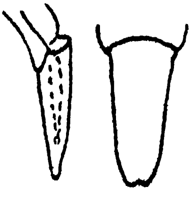
Long. 11½–12, lat. 5½–6 mm., ♂.

Uganda: Turkana Prov., v. 1934. L. Rudolf Rift Valley Exped., 1934 (D. R. Buxton coll.).

Adoretus turkanus, sp. n. (Fig. 3.)

Allied to *A. patruelis* Klb. (Meru). Ovate, moderately convex, upper and underside pale testaceous, brilliant, the antennæ and tarsi alone somewhat reddish, sparsely covered with short, erect, pale hairs. Clypeus nearly double as broad as long, the sides parallel in the ♂, convergent in the ♀, like head, prothorax, and scutellum sparsely covered with great annular punctures. Elytra with regular rows of punctures, the subsutural interstice

Fig. 3.



Adoretus turkanus, sp. n.

alone irregularly punctured, all punctures on the elytra smaller and more densely set than on the head and thorax. Pygidium very finely and densely sculptured, opaque, with shorter reddish hairs on the disk and longer, sparser bristles on the borders. Underside and legs more sparsely hairy. Antennal club shorter than the stem. Rostrum long and small, the sides of it and the labrum strongly notched. Ædeagus, fig. 3.

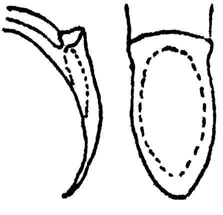
Long. 7½–8½, lat 4½ mm., ♂♀.

Uganda: Turkana Prov., Lodwar, 2. v. (1 ♀); Kakuma, 7. v. (1 ♀); Kabua, 7–8. v. 34 (♂♀) (D. R. Buxton coll.).

Adoretus æniceps, sp. n. (Fig. 4.)

Allied to *A. graniceps* Rttr. (Sudan). Oblong-ovate; moderately convex, upper and underside pale testaceous, forehead and vertex blackish brown, the tarsi reddish, upper and underside with short accumbent whitish hairs and longer brown bristles at the borders of thorax and elytra, on the legs, and abdominal sternites. Clypeus nearly semicircular, like the forehead, somewhat densely and here and there confluently covered with fine tubercles; vertex, thorax, and scutellum densely and confluently punctured. On the elytra the primary costæ are regular, but hardly elevated, all the interstices irregularly punctured. Pygidium finely transversely aciculate, with single greater punctures intermixed. Antennal club shorter than the stem. Rostrum of the labrum small and long, with strongly notched borders. Ædeagus, fig. 4.

Fig. 4.



Adoretus æniceps, sp. n.

Long. 8–9, lat. 4½ mm., ♂♀.

Uganda: Turkana Prov. L. Rudolf Rift Valley Exped., 1934 (D. R. Buxton coll.).

XXXV.—*The Races of Geoffroy's Cat* (Oncifelis géoffroyi). By R. I. Pocock, F.R.S. (Zoological Department, British Museum).

Of the smaller spotted cats of South America this is one of the commonest. The original specimens, collected by D'Orbigny on the Rio Negro, Patagonia, were described by Gervais in 1844 (Bull. Soc. Phil. Paris, p. 40; and Rev. Mag. Zool. (2), 6, pl. 57). The colour was said to be tawny grey (gris fauve) above, whitish grey (gris blanchâtre) below, and the plate in the latter work shows the body as darkish grey above, with some buff on the flanks *. The British Museum has a good series of skins from Mar del Plata (*W. Smithers*), Los Yngleses, Ajo, in Buenos Ayres (*E. Gibson*), Soriano in Uruguay (*Lewis* and *Aklin*), and from Noetinger in the lowlands of Eastern Cordova in the Argentine (*Kemp Coll.*). The colour of these may be very aptly described as "tawny grey" or "greyish tawny," sometimes the one tint, sometimes the other, being dominant. On the average there is a good deal of buff low down on the flanks, on the hind throat, and cheeks, but sometimes this is hardly perceptible †.

Characteristic of the species is the pattern, which on the upper side of the body consists of numerous small, close-set, mostly solid spots, and on the tail of definite, rather narrow, and tolerably evenly spaced rings.

In addition to the typical form which inhabits the lowlands of the countries above mentioned, there is a smaller race, *salinarum* (see below, p. 353), found in the higher, drier districts of the north-western Argentine. The British Museum has specimens from localities as widely separated as Mendoza and Cordova in the south to Jujuy in the north.

Examination of the material in the British Museum has brought to light three previously undescribed races.

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* A later figure published by D'Orbigny (Voy. Amer. Merid. pl. 14, 1847) representing a bright ochreous-tawny cat must be rejected as inaccurate because it agrees neither with the original figure nor description and is quite unlike any of the many specimens, living and dead, that I have seen from that part of South America.

† Gray described a specimen from "Tropical America" as *Felis pardoides* (Proc. Zool. Soc. 1867, p. 403). This is white on those areas; but recent skins show that the variation is individual. Another synonym, long well known, is *warwickii* Gray, based on a skull.

Oncifelis geoffroyi paraguæ, subsp. n.

Felis geoffroii P. L. Sclater, Proc. Zool. Soc. 1870, p. 796.

Locality and History of the Type.—Paraguay. Adult ♀, skin and skull, collected by Capt. E. Hairby, and presented by the Zoological Society, B.M. no. 71.3.3.6.

Distinguished from the more southern race, typical *geoffroyi*, by the much darker hue of the whole of the upper side, including the head, tail, and limbs, the general ground-colour being rather rich ochreous brown, becoming paler distally on the limbs and fading on the lower flanks to ochreous. In typical *geoffroyi* the colour is much paler tawny grey or greyish tawny, according to the dominance of one or the other tint, and the lower flanks are typically buff. The pattern is normal for the species, but rather exceptionally heavy on the legs.

This description is taken from the type; but there is a second skin of an immature specimen also from Paraguay, which was preserved when I was at the Zoological Society on account of its locality and dark hue. It is not so brown as the type, but is decidedly darker than skins of the typical race, with the ground-colour more ochreous and with less buff on the throat and sides of the belly; the pattern is normal for the species.

The skull of the type, ♀, is adult, and with a condylobasal length of 92 mm. is about the same size on the average as adult ♀ skulls of typical *geoffroyi*. The temporal ridges on the cranium form a wide lyrate area, are 16 mm. apart at the suture, 22 mm. on the parietals, and on the supraoccipital there is a sagittal crest 2 mm. high. The upper carnassial (*pm.*^{4}) is 12 mm. long, and the canine at the base 4¼ mm.

Oncifelis geoffroyi leucobaptus, subsp. n.

? *Oncoides geoffroyi* J. A. Allen, Mamm. of South Patagonia, p. 180, 1905; and, as *Oncifelis*, Bull. Amer. Mus. Nat. Hist. xli. pl. xxiii., 1919.

Locality and History of the Type.—Salamanca in the S. Chubut district of Patagonia. A young adult ♀, skin and skull, collected by Budin, B.M. no. 28.12.11.2.

Distinguished from typical *geoffroyi* by its considerably longer coat and paler hue.

Coat in midsummer (December 23) is full and soft and about 35 mm. long, 10 mm. or so longer than the winter coat of the more northern race. General tint of the upper side, tail, and legs grey, with only the faintest wash of buff on the back, the flanks clear grey, blending below with the white abdomen ; the head, face, cheeks, and chin whitish, the throat very nearly as white as the chest. In typical *geoffroyi* the general colour is a darker tawny grey, with on the average a varying amount of buff on the cheeks, throat, sometimes the chin as well, and on the lower flanks, where it encroaches over the sides of the belly.

This specimen seems to agree very closely with one from Cañada las Vacas, Patagonia, 51° S. lat., of which Allen in 1919 published a photograph with a note stating that the colour was light grey faintly toned with pale buff. He did not refer to the coat, which, considering that the specimen came from so far south and was collected in midwinter (July), should have been exceptionally luxuriant for the species. It is doubtful if Allen was acquainted with typical *geoffroyi*.

The ♂ skull from Cañada las Vacas described by Allen had a basal length of 98 mm., which is exactly the average of four adult ♂♂ of typical *geoffroyi* from Buenos Ayres, in which that dimension ranges from 95 to 101 mm. The upper carnassial is just over 13 mm. as large as in any of my skulls of the typical race.

Two undated skins, without skulls, in the British Museum from Nahuel Huapi, W. Patagonia (*Sir T. Holdich*), are not quite so pale as the type of *leucobaptus*, but have its full soft coat.

Oncifelis geoffroyi euxanthus, subsp. n.

? *Oncifelis salinarum* J. A. Allen, Bull. Amer. Mus. Nat. Hist. xli. p. 367, 1919 (in part, *e. g.* ♂ specimen from Sucre, Chuquisaca, Bolivia).

Locality and History of the Type.—Tiragui, Cochabamba district in the western Bolivian highlands, 3300 m. An adult ♂ collected by Steinbach, B.M. no. 34.9.2.27.

Resembling *salinarum* of the highlands of the north western Argentine in the smallness of the skull, but differing from it in cranial characters, in its much brighter colour above, absence of clear white below, and, according to the flesh-measurements, by its shorter tail.

Coat (August 21), full, soft, and about 25 mm. long. Ground-colour above bright buffy ochreous, the back more ochreous than the flanks, which are rather rich buff fading to whitish buff on the chest, belly, and inner side of the limbs, there being no clear white anywhere, even the ear-spot and hairs lining the ears being faintly buffy; the cheeks and throat are rich ochreous buff; the tail above is like the back, the limbs outside like the flanks, with the hairs round the pads and up to the heel on the hind foot deep blackish brown. The pattern is everywhere normal for the species.

The northern Argentine race *salinarum* * is extensively white below at all seasons, like typical *geoffroyi*, with some buff on the hind throat usually; but the upper side varies in colour seasonally, the winter coat, June to August, being full, soft, and tinged with pale buff or ochreous, noticeably brighter than the summer coat, which is comparatively thin and harsh, and fades to palish grey before being shed.

According to Steinbach the type of *euxanthus* in the flesh measured approximately in English inches: head and body 26, tail 11⅜, hind foot 4⅛, ear 1⅛. But since 26 in. is about the length of adult ♂ examples of typical *geoffroyi*, whereas the skull of *euxanthus* is much smaller than in that race, I suspect his record of the head and body as 650 mm. was a mistake for 550, which would make the head and body 22 in., only slightly less than twice the length of the tail. This conception brings the dimensions into much closer agreement with those of *salinarum*. There is no measured ♂ skin of the latter in the British Museum, but the larger of two from Sucre in Bolivia recorded by J. A. Allen (Bull. Amer. Mus. Nat. Hist. xli. p. 370, 1919) measured: head and body 20, tail 13⅝, hind foot 4⅜, ear 2. In this specimen, as in others he recorded, and as in several ♀ examples in the British Museum, the tail is considerably over half the length of the head and body.

The fully adult skull of the type of *euxanthus* † in size and muscular moulding closely resembles the ♀ skull of the type of *paraguæ*, above referred to. It has a condylobasal length of 92 mm., and the temporal ridges form a wide lyrate area 22 mm. wide on the parietals and 11 mm. at the suture, a little narrower here than in the skull of *paraguæ*. The other dimensions differ by a millimetre or two, but the nasals are 3½ mm. shorter in the middle line, 16 mm. as against 19½. The upper carnassial is 11 mm. long and the canine at the base 5 mm., the former being smaller and the latter slightly larger, a sexual difference, than in the type of *paraguæ*.

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* Although Thomas (Ann. & Mag. Nat. Hist. (7) xii. p. 239, 1903) gave this cat full specific rank, he quite correctly described it as a small highland representative of *geoffroyi*. Since I have no doubt whatever that it intergrades with typical *geoffroyi* I regard it as a local race.

† The correctness of its determination as ♂ is shown by the presence of the penis and of a large part of the scrotum on the skin.

The only adult ♂ skull of *salinarum* I have seen belongs to a skin from Penas in St. Luis (Moreno, no. 99.2.22.4), a locality not far from the type-locality of this race, Cruz del Eje in Cordova. This skull is a small duplicate of ♂ skulls of typical *geoffroyi*. It is muscularly well moulded, and has a complete sagittal crest about ½ mm. high on the crown, rising to 5 mm. on the supraoccipital. In the type of *euxanthus* there is no trace of the sagittal crest except on the supraoccipital, where it is only about 1 mm. high. The postorbital area is also more constricted, 24 mm. wide as against 26 in the type of *euxanthus*. For the rest the skull dimensions agree tolerably closely, the condylobasal length in the ♂ of *salinarum* being 91 mm., but the total length, in accordance with the better developed occipital crest, is 99 mm. as against 97 in the type of *euxanthus*, and the nasals are noticeably longer, being 20 mm. in the middle line as against 16 in *euxanthus*. This last is, however, an individual peculiarity of no systematic value.

J. A. Allen's figure of an adult ♂ skull, identified as *salinarum*, from Sucre in S. Bolivia, closely resembles the skull of the type of *euxanthus*, except that the postorbital area is less constricted, being 29 mm. as against 26; and it is a trifle smaller, the condylobasal length being 89 and the basal 81½ mm. as against 92 and 86 mm. But Allen records no difference in colour between the skins he had from Bolivia and those from the Argentine.

The skull of the type of *salinarum* is that of a young adult ♀ showing the usual signs of immaturity, such as the broad postorbital constriction, 29 mm. wide as against 24 in the adult type of *paraguæ*; but it is nearly full sized, the condylobasal length being 88 mm, The upper carnassial (pm^4) is 12 mm. long and the canine 5 mm. at the base.

A second species of *Oncifelis* is the typically Chilian Cat, *guigna* of Molina (Sagg. Stor. Nat. Chili, pp. 295 and 341, 1782), the type of *Noctifelis* Severtzow, to which full generic rank was given by J. A. Allen, despite the identity of its pattern with that of *geoffroyi* betraying unmistakable kinship between the two *. It is slightly smaller than *O. g. salinarum*, and mainly differs from it in its more degenerate, weaker skull and smaller teeth; but the colour is much darker, nearly as dark as in *O. g. paraguæ*, the winter coat is considerably more woolly, and the tail is on the average shorter.

Among the specimens in the British Museum one is of particular interest from having been collected by Koslowsky in the Valle del Lago Blanco, Chubut, Patagonia (B.M. no. 3.7.9.1). This bears out Thomas's statement that the southern Andes do not present the barrier to migration that obtains farther north.

XXXVI.—*Entomological Expedition to Abyssinia*, 1926–7: *Woodlice collected by Mr. J. Omer-Cooper.* By K. H. Barnard, D.Sc., F.L.S. (Assistant Director, South African Museum, Cape Town).

Mr. J. Omer-Cooper, knowing I was reporting on the Isopoda collected by Dr. Hugh Scott and Mr. E. B. Britton during the British Museum Expedition to South-Western Arabia (1937–8), suggested that I should at the same time study a collection made by him in 1926 in Abyssinia, an investigation he was himself too busy with other work to undertake. Dr. Scott supported this suggestion *. In agreeing to examine the Abyssinian collection I felt considerable diffidence, because Mr. Omer-Cooper had already started on the work, had sorted out the genera and species, and suggested names for some of the new species. With this initial help the study of the collection has been a simple matter; and I wish to express my thanks to Mr. Omer-Cooper for so kindly affording me this opportunity.

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* As surprising as was Allen's failure to detect this kinship was his suggestion that the Chilian Cat *colocola* Molina was a species of *Oncifelis*, although admitting that its "colour-characters do not indicate close relationship with *geoffroyi*." He relied upon Philippi's figure of the skull of *colocola*. But this is quite unlike any skull of the forms I assign to *Oncifelis* in its long, steeply inclined, anteriorly narrowed, depressed muzzle, but more particularly in the structure of the bulla, which has a large outer chamber defined from the inner by a deep groove, an exaggeration of the condition I described in *pajeros* (Ann. & Mag. Nat. Hist. (8) xx. p. 348, 1917), the type of the genus *Lynchailurus* to which Matschie assigned *colocola*.

Five genera are represented, all of which have been previously recorded from Abyssinia with the exception of *Porcellio*.

In compiling a list of Abyssinian species, it should be noted that Budde-Lund in 1899 (Rev. Crust. Isop. Terr. pp. 1, 12, 13, 20) and again in 1908 (Voeltzkow's Reise, ii. p. 277), in referring to Dollfus (Ann. Soc. Ent. France, lxi. p. 385, 1892) misquoted the locality as "Abyssinia" instead of Assinie (Ivory Coast, West Africa).

For an account of the Expedition of 1926–7, with notes on the localities, see Omer-Cooper, Proc. Zool. Soc. London, 1930, pp. 195–207, pls. i.–viii., maps 1 and 2.

PORCELLIO, s. str.

Verhoeff, SB. Ges. Naturf. Fr. Berlin, no. 3, p. 213, 1917 (2 pairs of pseudotracheæ).

In the present material there are three forms represented by males, and showing distinctive characters in the spines on the anterior peræopods. These are given specific names. Three other lots of specimens contain females only, and are not named.

All the forms belong to *Porcellio* as restricted, *i. e.*, with two pairs of pseudotracheæ; but I express no opinion as to which of the several subgenera is best suited to receive them.

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* [I received the typescript of this Report from Dr. Barnard in April, 1940, together with that on the collection made in 1937–8 in South-Western Arabia (the latter Report is appearing in the special publication on the results of the British Museum Expedition to South-Western Arabia issued by the Trustees of the British Museum). Owing to war conditions it has proved necessary to submit the present paper on woodlice from Abyssinia to the 'Annals and Magazine of Natural History,' and to publish it under the general title "Entomological Expedition to Abyssinia," though its subject is not strictly entomological, and it would normally have appeared in Mr. Omer-Cooper's series of papers on the Abyssinian Expedition in the 'Proceedings of the Zoological Society.'—HUGH SCOTT.]

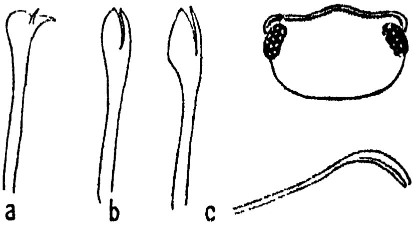
Porcellio spatulata, sp. n. (Fig. 1.)

Surface granulose-squamulose. Median lobe of head broadly rounded, lateral lobes feebly developed, front margin of head strongly costate, epistome evenly convex (no V-shaped groove). Ocelli 14–15.

Hind margin of peræon segments 1–3 not concave, of segment 1 curving forwards, of segment 2 slightly so, of segment 3 transverse; postero-lateral corners of segments 1 and 2 rounded, of 3 rounded-quadrate. Telson grooved.

Flagellum of antenna subequal to 5th peduncular joint, its 1st joint $\frac{2}{3}$ length of 2nd. Peræopods 1–3 ♂, 4th and 5th joints with strong brush of spines, which are apically clavate and unequally cleft. No sexual difference in peræopod 7.

Fig. 1.



Porcellio spatulata: dorsal view of head, and spines from 1st peræopod ♂ (*a* from base of 4th joint; *b*, from distal part of 4th joint; *c*, the same from 5th joint, with lateral view).

Up to 10×4 mm. Coloration similar to that of *P. ratzeburgii* (*cf.* Webb & Sillem, Brit. Woodlice, pl. xviii.).

Loc. Abyssinia: Jem-Jem Forest, 8000–8100 ft., 21–26. ix. 1926 (*Omer-Cooper*). A lot, ♂, ovig. ♀, juv.

4 ♀ and 1 juv. from "heath-land on summit of Mt. Chillálo, 12,000–13,000 ft., 18. xi. 1926 (*Scott*)," may belong to this species.

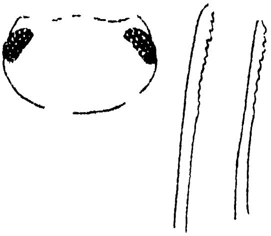
Porcellio obtusiserra, sp. n. (Fig. 2.)

Lateral lobes of head feebly developed, front margin of head not strongly costate. Eyes rather large, ocelli 22–24.

Peræopods 1–3 ♂, 4th and 5th joints with brush of spines, which are apically blunt, with the distal half of hind margin serrate or lobulate.

7·5 × 2·75 mm. Colour pattern as in *P. ratzeburgii.*

Fig. 2.



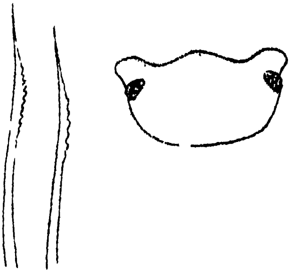
Porcellio obtusiserra: head, and spines from 4th and 5th joints of 1st peræopod ♂.

Loc. Abyssinia: Addis Ababa, over 8000 ft., 16. ix. 1926, 8 ♂, ♀; Jem-Jem Forest, ca. 8000 ft., 21 and 25. ix. 1926, 29 ♂, and ovig. ♀ (all *Omer-Cooper*).

Porcellio acutiserra, sp. n. (Fig. 3.)

Lateral lobes of head well developed, front margin not strongly costate. Eyes rather small, ocelli 10–11.

Fig. 3.



Porcellio acutiserra: head, and spines from 4th and 5th joints of 1st peræopod ♂.

Peræopods 1–3 ♂, 4th and 5th joints with strong brush of spines, which are elongate, tapering to fine points, with a portion of the hind margin serrate.

6·5 × 2·5 mm. Slaty-grey, with pale vermiculation on either side of the dark medio-dorsal stripe.

Loc. Abyssinia: lakes of Addas, shore of Hora Harsadi, ca. 7000 ft., 3. xii. 1926, 32 ♂ and some ovig. ♀ (*Omer-Cooper*).

Porcellio spp. (♀).

(*a*) Hind margins of peræon segments 1–3 very feebly concave. Lateral lobes of head well developed. 9 × 5 mm. Coloration similar to that of *P. ratzeburgii*, but with pale medio-dorsal line on the median dark stripe, postero-lateral corners of epimera mostly pale.

Loc. Abyssinia: Mt. Zukwala, ca. 9000 ft., 24. x. 1926, 2 ovig. ♀, 2 juv. (*Omer-Cooper*).

(*b*) Hind margins of peræon segments 1–3 straight, that of segment 1 curving forwards. Lateral lobes of head feebly developed. 8 × 4·3 mm. Coloration similar to the preceding.

Loc. Place and date the same as above, 1 ovig ♀.

(*c*) Specimens from Mt. Chillálo: see under *spatulata.*

CUBARIS, s. lato.

In view of the present unsatisfactory state of the classification, and Arcangeli's opinion (Boll. Mus. Torino, xliii. p. 31, footnote 2, 1933) that the African forms do not belong to the genus (subgenus) *Diploexochus*, I place the following two new species in *Cubaris* s. lato. Neither of them belongs to *Cubaris* s. str. on account of the mandible, and both may be referable to *Polyacanthus.*

Cubaris harsadiensis (Omer-Cooper MS.), sp. n.
(Fig. 4.)

Strongly convex, 1st epimeron and the pleuræ splayed out horizontally. Head, peræon, and pleon nodulose.

Peræon segment 1 with 4 transverse rows containing 4, 4, 10, 9 nodules respectively, 2 laterally at junction with epimeron. Segments 2–7 with smooth anterior part and raised posterior part, the latter with 2 transverse rows of 10 and 8 nodules respectively, but the 7th segment with only 6 nodules in the hinder row. The hind row on all segments projecting and forming a scalloped margin. Pronotum about $\frac{1}{8}$–$\frac{1}{10}$ dorsal length of segment.

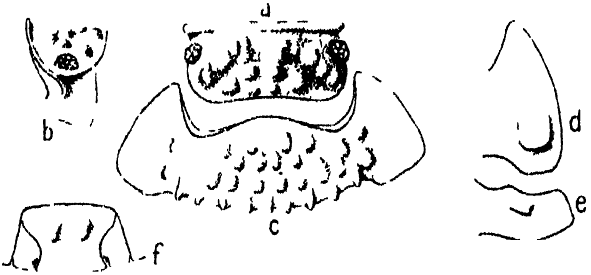
Epimeron of 1st segment large, thin, internal tooth rather broad, rounded ; internal tooth on segment 2 small.

Pleon with a single row of nodules on each of segments 3–5 containing respectively 6, 6, 4 nodules. Telson broader than long, sides incurved, hind margin almost straight, proximally 2 large nodules.

Mandible with only a single free penicil.

Third joint of antenna slightly shorter than the subequal 2nd and 4th, 5th longer, flagellum equal to 3rd joint, its 2nd joint twice as long as the 1st.

Fig. 4.



Cubaris harsadiensis : *a*, dorsal, and *b*, lateral view of head ; *c*, 1st person segment ; ventral view of epimeron of, *d*, 1st, and *e*, 2nd person segment ; *f*, telson and uropods.

Uropod, peduncle about as broad (basally) as long, subtriangular, inner ramus short, broadly oval, outer ramus minute.

Width 2·5 mm. (length ca. 6 mm.). Pale slaty-grey, eyes black.

Loc. Abyssinia : lakes of Addas, shore of Hora Harsadi, ca. 7000 ft., 2–3. xii. 1926, 8 specimens (*Omer-Cooper*).

In general appearance not unlike *Polyacanthus transvaalensis* Barnard, 1932.

Cubaris oxyzomus (Omer-Cooper MS.), sp. n. (Fig. 5.)

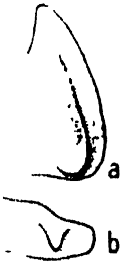
Agrees with *harsadiensis*, but with less numerous, and larger, more conical, nodules, especially on hinder part of person.

On head only 12 nodules, no small intervening ones. Person segment 1 with 4 rows with resp. 4, 1, 10, 9 nodules. Segments 2–6 with 8 and 7 nodules resp. in the 1st and

2nd rows; segment 7 with resp. 6 and 5. (In *harsadiensis* there is no *median* nodule on any of the peræon segments except the hind row on 1st segment; in *oxyzomus* there is a median tooth in the hind row on all the segments.)

Pleon segments 3–5 each with 2 nodules.

Fig. 5.



Cubaris oxyzomus: ventral view of epimeron of, *a*, 1st, and *b*, 2nd peræon segment.

The internal tooth on the 1st peræon segment is nearer the postero-lateral corner of the epimeron, and its outer edge is continued forwards as quite a *sharp* ridge parallel with the lateral margin of the epimeron. Internal tooth on segment 2 much stronger.

Width 1·3 mm. Dark slaty-grey, eyes black.

Loc. Abyssinia: Jem-Jem Forest, ca. 8000 ft., 20. ix. 1926, 2 specimens (*Omer-Cooper*).

PERISCYPHIS Gerst.

Omer-Cooper, Proc. Zool. Soc. Lond. 1926, p. 354 (revision and key to species).
Arcangeli, Ann. Mus. Zool. Naples, v. no. 23, pp. 1–20, 1929.
Barnard, Ann. S. Afr. Mus. xxx. p. 292, 1932; id., 'The British Museum Expedition to South-Western Arabia, 1937–8,' vol. i. part 1 (shortly to appear).

Periscyphis undulatus Omer-Cooper.

Omer-Cooper, *l. c.* p. 373, figs. 37–41, 1926 (*undulata*).

Loc. Abyssinia: lakes of Addas, shore of Hora Harsadi, ca. 7000 ft., 2–3. xii. 1926, a large number, ♂, ovig. ♀ (*Omer-Cooper*).

Previously recorded from Addis Ababa, "Shoa bei Bala," and "Shoa Galla."

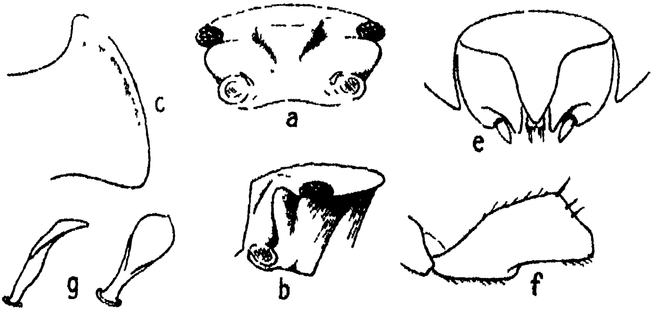
The spines on the lower surface of the 6th joint of peræopod 1 ♂ are of the "battle-dore"-shaped type as figured for the following species, and quite different from those of *trivialis.*

Periscyphis hughscotti (Omer-Cooper MS.), sp. n.
(Fig. 6.)

Moderately convex, smooth but (when examined dry) sometimes very feebly rugulose on the peræon segments where the pale vermiculate marks are situate.

Head with median portion of epistome rather prominent, separated from forehead more by the difference in angle of slope than by a definite ridge or costa; side-lobes extending inwards a little beyond eyes.

Fig. 6.



Periscyphis hughscotti, a, frontal, and *b,* lateral view of head; *c,* dorsal view of right half of 1st peræon segment; *e,* telson and uropods; *f,* 3rd joint of 7th peræopod ♂; *g,* spines from 5th joint of 1st peræopod ♂.

No thickened girdle on peræon segment 1, no groove either on anterior margin (adjoining head) or laterally, the thin lateral margin forming a flange to the convex portion of the segment.

Pleuræ not greatly expanded, outline of the two sides if continued meeting almost at the telsonic apex. Telson with sides well indented, apex subacute.

Flagellum of antenna with 1st and 2nd joints subequal.

Peræopods 1–3, ♂, 5th joint with lower margin densely armed with "battle-dore"-shaped spines (narrow in lateral view, expanded in surface view).

Peræopods 7, ♂, 3rd joint well modified, elongate, triangular, upper margin keeled, lower margin stepped, *i. e.*, the proximal half keeled, distal half more or less flattened.

Pleopod 1, ♂, apex of inner ramus normal (*i. e.* with process).

Peduncle of uropod extending slightly beyond apices of 5th pleuræ and telson, inner ramus extending almost to end of peduncle, outer ramus inserted in a rather deep terminal notch.

Up to 9 × 4 mm., ♂ usually smaller than ♀. Slaty-grey, with pale medio-dorsal line on peræon and pleon, pale vermiculate marks on each peræon segment dorsolaterally, a pale stripe on each peræon segment approximately at junction with epimeron, with a pale, more indefinite mark on each epimeron ; as the pale stripes are slightly curved and oblique they form a zigzag line in lateral view ; pleon and telson mainly uniform, except for the more or less distinct pale medio-dorsal stripe, and some pale marks on the pleuræ ; uropods pale at base, suffused towards inner apex of peduncle ; antennæ slaty-grey ; legs pale, faintly suffused in some cases ; eyes black.

Loc. Abyssinia : Addis Ababa, British Legation, over 8000 ft., 10. ix. 1926, a number of specimens (♂ and ovig. ♀) ; Jem-Jem Forest, ca. 8100 ft., 21. ix–10. x. 1926, a number of specimens (♂ and ovig. ♀) (all *Omer-Cooper*).

Somewhat like *convexus* as regards the bulge in front of the head, but distinguished by the simple flange-like margin of the 1st peræon segment. Distinguished from *civilis* B.-L., *vittatus* O.-C., and *besi* Barnard (Arabia) by the shape of the head and the better development of the flange on the 1st peræon segment ; from *besi* also by the shape of the spines on the 5th joint of the 1st peræopod ♂.

The specific name was given by Omer-Cooper in manuscript, in respect for his companion Dr. Hugh Scott. I have not seen Omer-Cooper's description, and for purposes of the above description I have not used the ♂ and ♀ labelled by him as types.

MICROCERCUS Budde-Lund.

Budde-Lund, Sjöstedt's Kilimanjaro-Meru Exp. iii. no. 21, p. 14, 1910.
Omer-Cooper, Proc. Zool. Soc. Lond. 1926, pp. 351, 354, 365.
Arcangeli, Boll. Lab. Zool. Portici, xxvi. p. 48, 1932 ; id., Boll. Mus. Zool. Torino, xliii. pp. 64, 66, 1934.

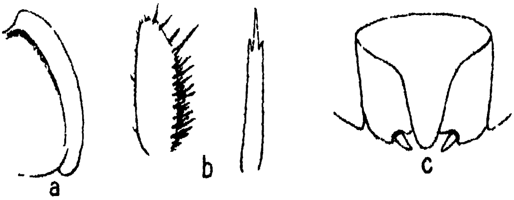
Budde-Lund in 1910 placed 7 species in this genus.

Amongst them were *nanus* B.-L. 1898, and *obtusicauda* B.-L. 1898. The original descriptions of both of these (Deutsch-Ostafrika, iv. Land Isop. pp. 5, 6, 1898) stated the hind corner of the 1st epimeron to be "nicht gespalten." To include these two species, therefore, Budde-Lund worded his diagnosis: "[Trunci segmentum 1 epimero] . . . post fisso, rarissime integro"; thus whittling away the main difference between this genus and *Periscyphis*. The other feature distinguishing this genus from *Periscyphis* (1st maxilla, outer lobe with 10 instead of 9 spines) is, as Omer-Cooper remarks, of doubtful value.

Microcercus abyssinicus, sp. n. (Fig. 7.)

Body convex, smooth, minutely shagreened. Head with a very obscure ridge separating forehead from epistome, curving down laterally in front of eyes, and in the middle line continued on to the central vertical ridge on either side of which the epistome is concave. In frontal view the ridge forms an arcuate line.

Fig. 7.



Microcercus abyssinicus: *a*, dorsal view of right half of 1st peræon segment; *b*, 5th joint of 1st peræopod ♂ (with lateral view); *c*, telson and uropods.

Peræon segment 1, girdle thick, in true side view the groove extends as an open groove only about half way, no triangular anterior depression.

Telson triangular, sides indented, tapering to a narrowly-rounded apex, extending a little beyond apices of 5th pleuræ.

Eyes small, not prominent, ocelli 5–6 (difficult to count). Flagellum of antenna scarcely as long as 5th peduncular joint, its 1st joint about one-third length of 2nd.

Peræopods 1–3, 4th and 5th joints more densely spinose on lower margin in ♂ than in ♀. Peræopod 7 ♂ not modified.

Pleopod 1, ♂, inner rami tapering to acute points.

Uropod, peduncle, oblong, narrowing slightly distally, inner ramus extending to apex of peduncle, outer ramus well developed, inserted terminally.

Width 2·5–2·75 mm. Pale slaty-grey, the margins of the segments and the usual vermiculate lines on the peræon segments pale yellowish, eyes black.

Loc. Abyssinia: Jem-Jem Forest, 8100 ft., 21. ix. and 11. x. 1926, 1 ♂, 1 ♀ (*Omer-Cooper*).

As *obtusicauda* is, in my opinion, better not included in *Microcercus*, this is the only species with the telson tapering to a rather elongate pointed apex. The telson does not project so far beyond the 5th pleuræ as in *obtusicauda*.

EUBELUM Budde-Lund.

Budde-Lund, Rev. Crust. Isop. Terr. p. 3, 1899; id., Ark. Zool. vii. no. 26, p. 2, 1912.
van Name, Bull. Amer. Mus. Nat. Hist. xliii. p. 78, 1920.

The East African and Abyssinian species of this genus are as follows: *pila* B.-L. 1898, Runzoro, 2600 metres; *instrenuum* B.-L. 1912, British East Africa; *quietum* B.-L. 1899, Shoa, Abyssinia; *dollfusii* B.-L. 1899, Shoa, Abyssinia; and *ignavum* B.-L. 1899, Shoa, Abyssinia.

Eubelum dollfusii Budde-Lund. (Fig. 8.)

Budde-Lund, *l. c.* p. 8, pl. ii. figs. 15–18, 1899.

Loc. Abyssinia: Addis Ababa, over 8000 ft., 16. ix. 1926, 2 specimens (*Omer-Cooper*).

Two specimens appear to agree with Budde-Lund's description. If these and the following specimens are correctly identified, I consider that *ignavum* is at most only a variety of *dollfusii*. Except in the strength of the ridge forming the upper margin of the epistome, I find no difference in the specimens before me.

Eubelum ignavum Budde-Lund. (Fig. 8.)

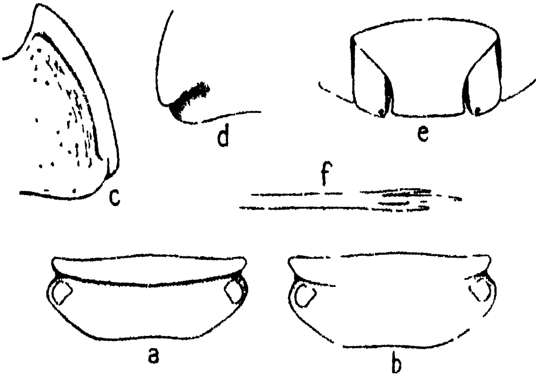
Budde-Lund, *l. c.* p. 9, pl. ii. figs. 9–11, 1899.

Loc. Abyssinia: Jem-Jem Forest, 8100–9000 ft., ix–x. 1926, 23 ♂, ovig. ♀, juv. (*Omer-Cooper* and *Scott*);

lakes of Addas, shore of Hora Harsadi, ca. 7000 ft., 2. xii. 1926, 1 specimen (*Omer-Cooper*).

Up to 9 (ca.)×4·5 mm. Slaty-grey, pale vermiculate lines on peræon segments dorso-laterally more or less distinct, epimera usually pale, often a pale mark on the pleuræ, antennæ grey, legs pale, more or less suffused, eyes black.

Fig. 8.

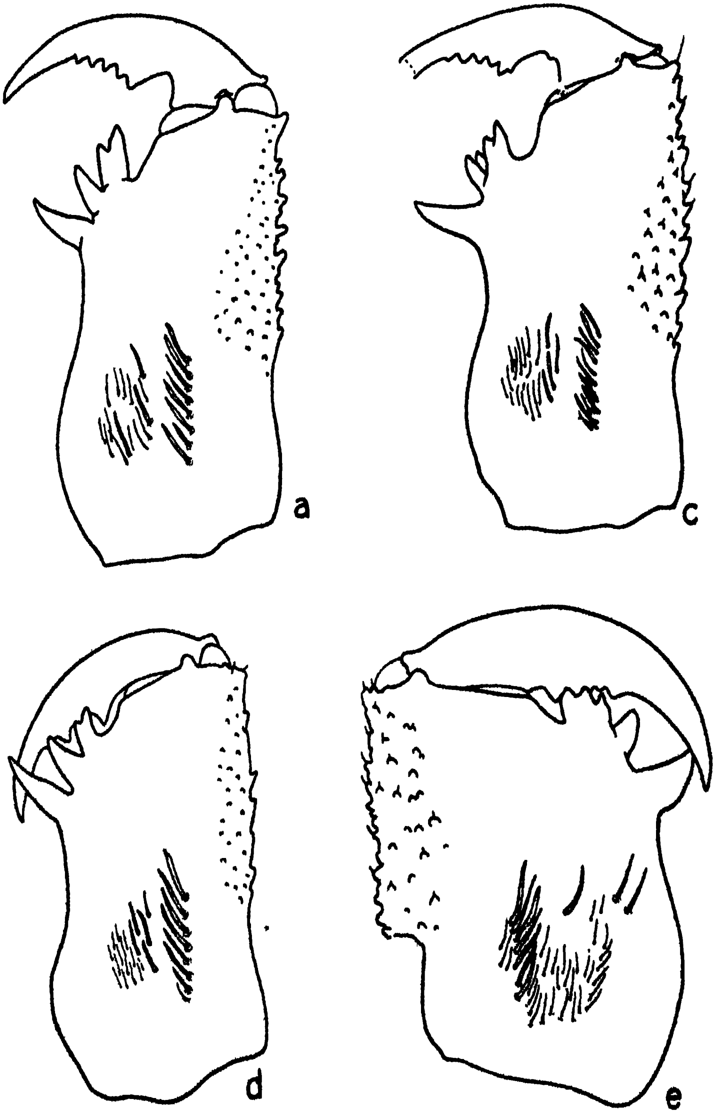


Eubelum dollfusii and (?) var. *ignavum*: dorsal view of head of, *a*, *ignavum* (Jem-Jem Forest), *b*, *dollfusii* (Addis Ababa); *c*, dorsal, and *d*, ventral view of right half of 1st peræon segment; *e*, telson and uropods; *f*, spine from 5th joint of 1st peræopod ♂.

XXXVII.—*On some African Specimens of* Phrynichus *Karsch* (*Arachnida, Pedipalpi*). By R. J. Whittick, B.Sc., Department of Zoology, British Museum (Natural History).

The unfortunate confusion in the generic names of the Amblypygous Pedipalpi belonging to the Phrynichinæ, Simon, 1892, is surely without parallel in zoological nomenclature. The position is discussed by Pocock (1902), Kraepelin (1904), and Mello-Leitão (1931), and

Fig. 1.



Internal face of chelicera.

a, c, d. Phrynichus bacillifer (Gerst.). *a* and *c* × 8, *d* × 11: the letters correspond with the list of specimens on p. 374. *e. P. exophthalmus*, sp. n. × 8.

references to the relevant literature are given in these papers. In my opinion the case calls for a recommendation by the International Committee of Zoological Nomenclature, but until this is given I shall accept Kraepelin's solution of the problem. *Phrynus* Latreille, 1802, is regarded as synonymous with *Tarantula* Fabricius, 1792, having as type *T. palmata* (Herbst), i. e., *T. reniformis* Fabr. (non Linn.), and the true *reniformis* Linn. becomes the type of *Phrynichus* Karsch, 1879.

Kraepelin, revising the Pedipalpi in 1895 and 1899, grouped all the then described species of *Phrynichus* under two names—*P. reniformis* (Linn.) and *P. bacillifer* (Gerst.). Later Gravely (1915), with a richer collection at his disposal, felt compelled to revive several of the species which Kraepelin had regarded as synonymous with *P. reniformis*, and even to describe new forms, though he pointed out that the specific identity of the two classical species, *P. reniformis* (Linn.) and *P. lunatus* (Pallas), would remain in doubt until the type-specimens had been redescribed. Similarly, Simon (1936) distinguished three species under *bacillifer*, s. lat.

Dr. Fage, in a recent paper (1939), describes a cheliceral stridulating organ which he considers an important generic criterion in the allied Damoninæ. Similar stridulating organs are known in the Mygalomorph spiders and in *Opisthophthalmus*, a genus of scorpions (Pocock, 1896), but had not been observed in Amblypygi before 1939. On examination *Phrynichus* also proves to be characterized by the presence of serially arranged spinules on the inner surfaces of the cheliceræ: an antero-ventral projection of the prosoma between the cheliceræ (the epistome) reaches the bases of these spinules, and in some specimens, preserved in spirit, manipulation of the cheliceræ causes the spinules to vibrate audibly, though, of course, it is not certain that the living animal stridulates in this manner. All the specimens of the genus that I have examined possess similar spinules, and though it has not been possible to test the constancy of their arrangement (as a specific criterion) on a long series of specimens from different localities, the cheliceral spinules of the specimens considered in this paper are illustrated in figs. 2 *a*–*d* and 3 (i).

Phrynichus bacillifer (Gerst.), s. lat.

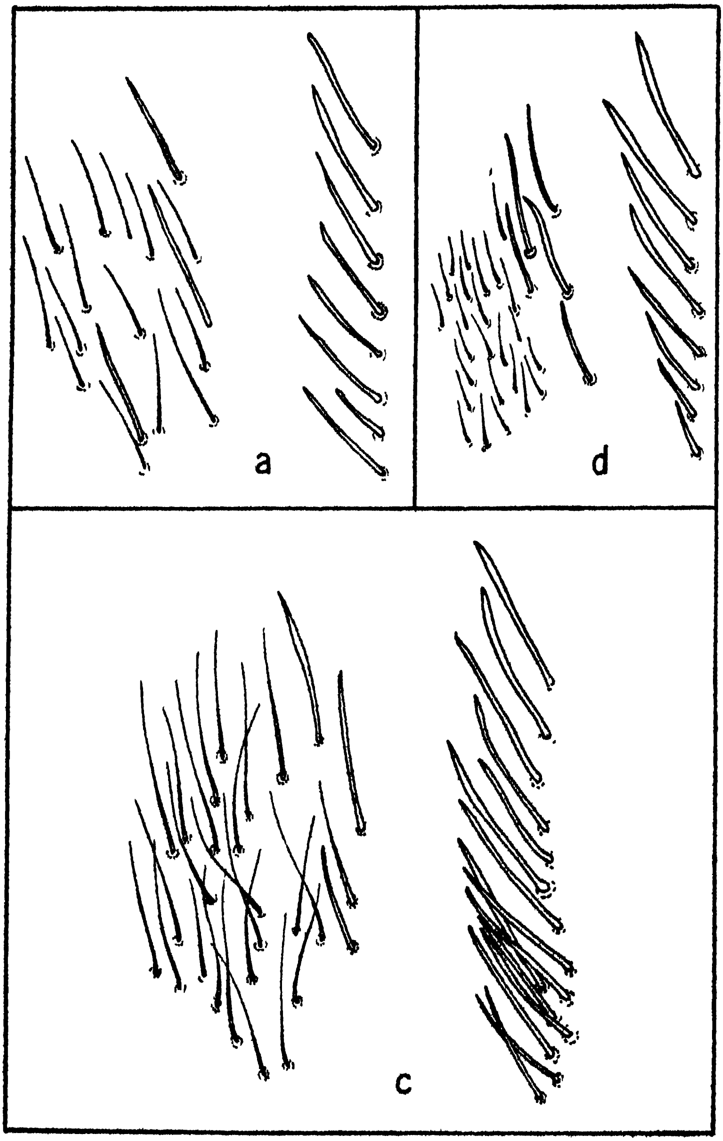
Phrynichus bacillifer was separated by Kraepelin from *P. reniformis* on the presence of bacilliform femoral apophyses and the absence of spines along the lower margin of the femur; in *reniformis*, s. lat., the femoral apophyses are represented by short spines, and spines are also present along the lower margin of the femur.

Simon (1936) distinguishes three species under *P. bacillifer*, s. lat., namely, *P. bacillifer* (Gerst.), s. str., *P. telekii* Sim., 1890, and *P. alluaudi* (Sim., 1936). In *P. alluaudi* the median ocular tubercle is quite smooth and the epistome is short and broad, whereas in the other two species the ocular tubercle is granular and the epistome is relatively long and narrow. *P. telekii* is distinguished by the superior internal tibial apophysis of the pedipalp being fusiform in shape, only four-fifths as long as the inferior internal apophysis, and bearing underneath a single regular row of denticles, while the principal femoral apophysis is somewhat longer than the diameter of the femur, dilated, compressed and truncated at the tip. In *P. bacillifer*, s. str., on the other hand, the superior internal tibial apophysis tapers evenly from base to tip, is five-sixths as long as the inferior internal apophysis, and bears underneath a number of denticles which are not altogether regularly arranged in a single row; moreover, in *bacillifer*, s. str., the length of the femoral apophysis is no more than two-thirds the diameter of the femur, and in shape it is cylindrical, obtuse but not dilated.

The collection of the British Museum (Natural History) contains the following specimens of *P. bacillifer*, s. lat. :—

Locality.	Registered no.	Sex.	Width of prosoma x.	Length of femur (= tibia) y.	$x : y$.
			mm.	mm.	
a) Taveta, nr. Kilimanjaro.	1887.146	♀	17·0	41	1 : 2·41
b) Machakos, Kenya.	1900.3.16.1	juv.	10·0	18	1 : 1·80
c) Tendaguru, Tanganyika Territory.	1926.6.19.11	♂	15·0	39	1 : 2·60
d) Morogoro, Tanganyika Territory.	1923.11.8.26–27				
	(1)	♂	12·0	27	1 : 2·25
	(2)	juv.	9·0	15	1 : 1·66

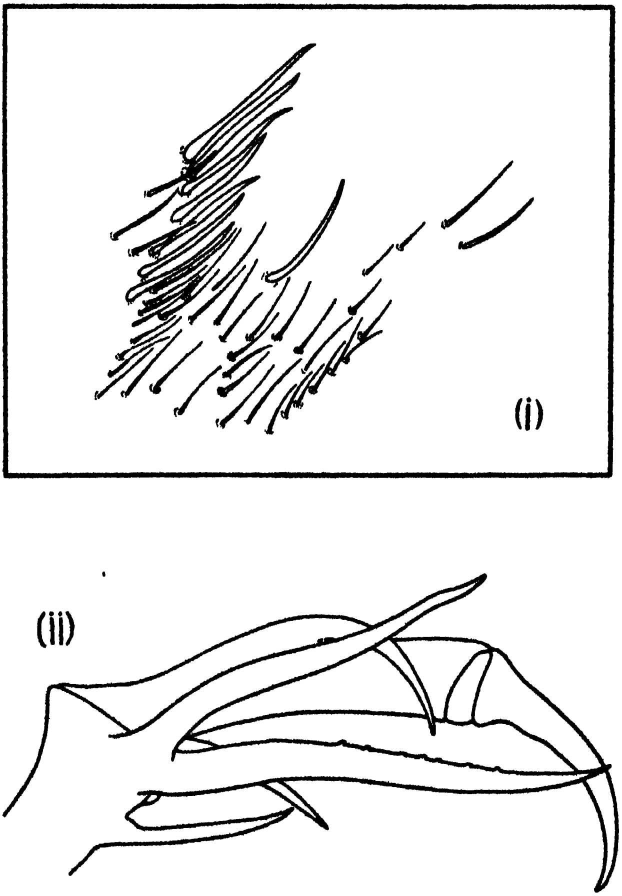
Fig. 2.



Phrynichus bacillifer (Gerst.). Cheliceral spinules. *a* × 33, *c* × 40, *d* × 30 : the letters correspond with the list of specimens on p. 374.

None of these specimens would appear to belong to *P. alluaudi* (Sim.) since, in all of them, the epistome is pointed and longer than wide, while the medial ocular

Fig. 3.

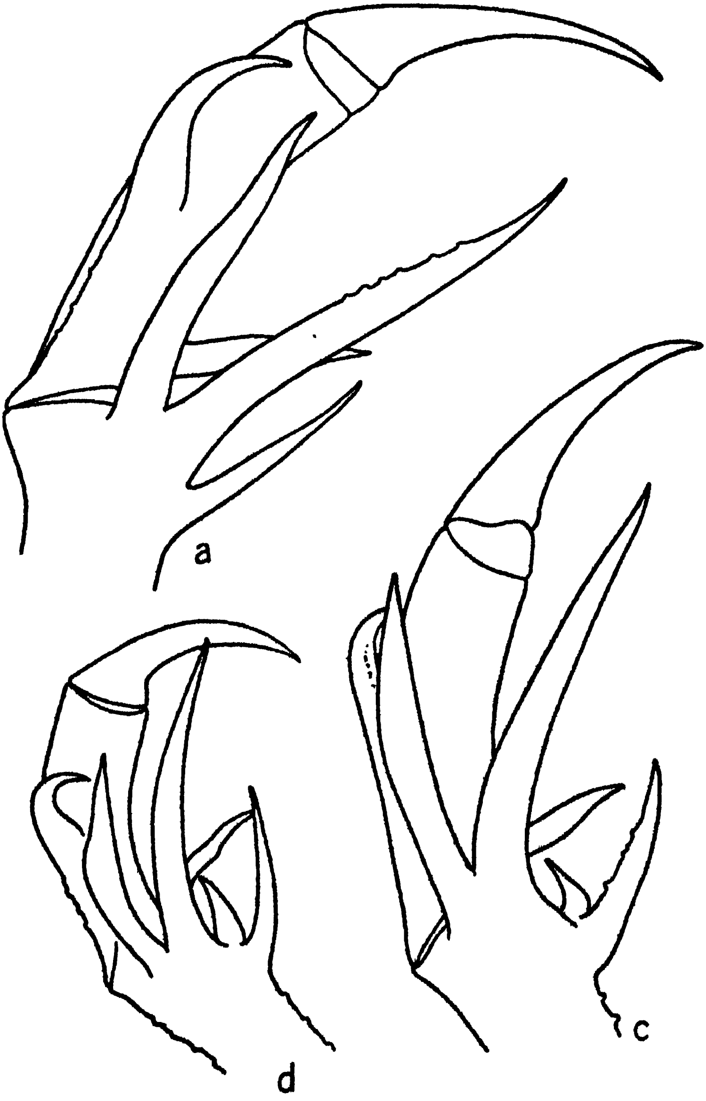


Phrynichus exophthalmus, sp. n.

(i) Cheliceral spinules, × 25.
(ii) Tibial apophyses and "hand" of pedipalp, × 8·5.

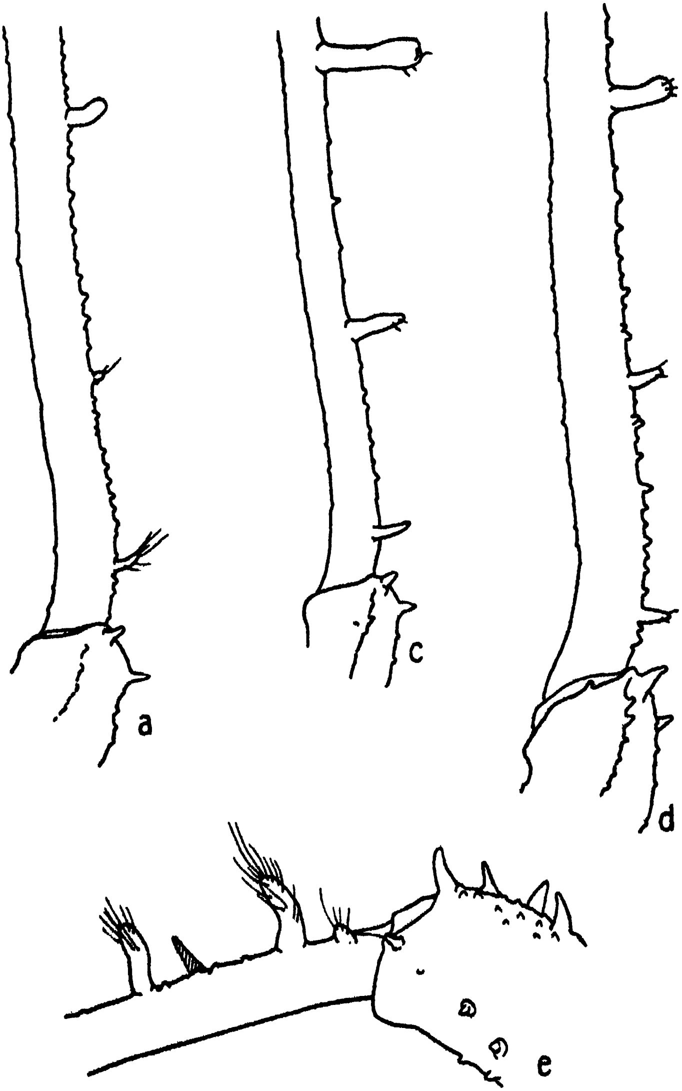
tubercle is more or less granular; but it is observed that the latter is a variable feature, and the ocular tubercle tends to be less granular in the small than in the large

Fig. 4.



Phrynichus bacillifer (Gerst.). Tibial apophyses and hand of pediplp, dorsal aspect.
a and *c* × 9, *d* × 8 : the letters correspond with the list of specimens on p. 374.

Fig. 5.



Base of pedipalpal femur, dorsal aspect.

a, c, d. Phrynichus bacillifer (Gerst.); *a* and *c* × 4·5, *d* × 8 : the letters correspond with the list of specimens on p. 374. *e. P. exophthalmus*, sp. n., × 7·5.

specimens. The tibial and femoral apophyses of the pedipalp are illustrated for the adult specimens in figs. 4 and 5 respectively, and it will be seen that specimen (*a*) agrees with Simon's *P. bacillifer*, s. str., while (*c*) and (*d*) fall into *P. telekii* Sim. In (*a*), a gravid female, the posterior margin of the first opisthosomal sternite is concave and fringed with hairs, while in (*c*) and (*d*) these hairs are absent, and the surface of the sternite bears a small, pointed tubercle on each side at the posterior edge and close to the median line. I conclude that (*c*) and (*d*) are males, and that the differences between *P. telekii* and Simon's *P. bacillifer* (Gerst.), s. str., are of a sexual nature: that *P. telekii* Sim. is, in fact, the male of *P. bacillifer*, s. str. This view has already been expressed by Kraepelin (1895, p. 12). It is to be noted that differences in the arrangement of the cheliceral spinules (fig. 2) are not correlated with Simon's criteria.

Besides the material listed above the collection of the British Museum (Natural History) contains another specimen identified by Pocock as *Tarantula bacillifer* (Gerst.), from a fifth African locality. It differs in several characteristics from the specimens already considered, and is described below as a new species.

Phrynichus exophthalmus, sp. n.

Material.—One ? male specimen, the holotype, somewhat damaged (*i. e.*, parts of leg II on one side, and legs III and IV on the other, have been lost). Collected by G. L. Bates. Registered no. 1940.5.3.1.

Locality.—Twenty-five miles east of Kribi, Cameroons.

Description.—*Dimensions*: length, excluding cheliceræ, 25 mm.; prosoma 10 mm. long, 15·5 mm. wide; opisthosoma 16 mm. long, 12 mm. wide; length of femur (=length of tibia) 51 mm. *Prosoma*: dorsal surface fairly densely and evenly granular, the anterior edge almost smooth, the antero-lateral, lateral, and posterior edges densely and finely crenate; median ocular tubercle relatively large and prominent, almost spherical, with few granules, and projecting forward so far that, viewed from vertically above, the eyes are seen to project by more than half their diameter beyond the anterior edge of the prosoma; epistome acutely triangular, 1·7 mm. long on a base of 0·9 mm. *Opisthosoma*: dorsal surface finely shagreened, with a few small granules, mainly along the posterior edge of each tergite; ventral surface quite smooth; the first sternite without a fringe of hairs on the posterior edge, but bearing a pair of small tubercles close to, and one on each side of, the median line (? a male sexual character). *Chelicera*: basal segment short and broad, the profile of the dorsal surface abruptly depressed about one-third of its length from the base; distal edge with two teeth, the ventral one simple, conical, and the dorsal one consisting of three cusps, one external and two internal; the internal surface bears numerous spinules whose arrangement is shown in fig. 3 (i). *Pedipalp*: very long and slender, the ratio "width of prosoma to length of femur" being 1 : 3·29; trochanter with four spines along the postero-dorsal ridge, two widely separated spines on the antero-dorsal edge, and two close together on the antero-ventral edge (see fig. 5 *e*, where, however, the basal spine of the postero-dorsal row is not shown); femur cylindrical and, for much of its length, only about 1·2 mm. in diameter; it bears three antero-dorsal apophyses grouped close together at the base; the most proximal is small; the two distal ones are slightly longer than the diameter of the femur, constricted in the middle and somewhat curved; all three are bluntly rounded at the end and each bears a tuft of strong reddish bristles; antero-ventrally, about halfway between the two main dorsal apophyses, the femur bears a well-developed conical spine about 0·75 mm. long and tipped with similar reddish bristles; surface of the femur finely and sparsely granular; tibia as long and slender as the femur, the surface granulation similar; tibial apophyses long and slender; three of them are illustrated in fig. 3 (ii), and the fourth, the most ventral, is short, almost straight, and tapering to a point; "hand" fairly thickly covered with granules, especially on the dorsal surface, with two spines, one dorsal, one internal, and both shown in fig. 3 (ii).

Remarks.—In Africa the genus *Phrynichus* has so far been reported only from the eastern half of the continent, and this specimen from the Cameroons increases the known range considerably. The new species differs from the *reniformis*-group in having bacilliform antero-dorsal femoral processes, but with regard to the antero-ventral spine it would appear to be intermediate between the *bacillifer*-group and the *reniformis*-group. It differs from Simon's description of *P. alluaudi* in having a long narrow epistome and granulation on the median ocular tubercle. Compared with the specimens of *P. bacillifer* (Gerst.) which are noted above the following differences are observed :—

1. In *bacillifer* the basal segment of the chelicera is long and narrow, and the profile of the dorsal surface is more or less straight : in *exophthalmus* this is not so. (Compare (*e*) with (*a*), (*c*), and (*d*) in fig. 1.)

2. There is a difference in the grouping of the cheliceral spinules. (Compare fig. 3 (i) with fig. 2.)

3. In *bacillifer* the pedipalpal trochanter bears only three well-developed spines, which lie on the distal edge of the segment, one median dorsal, one antero-ventral, and one median ventral : in *exophthalmus*, as described above, the spines are more numerous.

4. In *bacillifer* the bacilliform processes of the pedipalpal femur are fairly widely spaced : in *exophthalmus* they are grouped close together at the base.

5. In *bacillifer* the most ventral of the four apophyses of the pedipalpal tibia is strongly curved and chisel-shaped at the end : in *exophthalmus* this is not the case.

6. In *exophthalmus* the length of the pedipalpal femur and tibia is much greater in comparison with the width of the prosoma than in *bacillifer* specimens of a comparable size.

7. In *exophthalmus* the median ocular tubercle is more prominent and set further forward on the prosoma than in *bacillifer*.

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XXXVIII.—*Eleven new Generic Names in Orthoptera.* By B. P. Uvarov, D.Sc., British Museum (Natural History).

The present paper is a continuation of the three lists of new generic names in Orthoptera proposed to replace preoccupied ones, and published in this Journal (Ann. & Mag. Nat. Hist. ser. 11, vol. iii. 1939, pp. 457–459; vol. v. 1940, pp. 173–176; vol. vi. 1940, pp. 112–117). The list covers the names beginning with the letters R to X inclusive, and concludes the series.

Ramona Bruner, 1905 (Acrididæ), is preoccupied by *Ramona* Casey, 1886 (Coleoptera), but a new name, *Spaniacris*, has already been proposed by Hebard (Trans. Amer. Ent. Soc. lxiii. 1937, p. 375) for the genus.

Saussureana I. Bolivar, 1916 (Acrididæ), preoccupied by *Saussureana* Haller, 1880 (Crustacea), re-named **Saussurea**, n. n.

Schinzia Saussure, 1899 (Acrididæ), preoccupied by *Schinzia* Naegeli, 1842 (Protozoa), re-named **Echinacris**, n. n.

Scopiorus Stål, 1873 (Tettigoniidæ), preoccupied by *Scopiorus* Foerster, 1868 (Hymenoptera), re-named **Scopioricus**, n. n.

Scottia I. Bolivar, 1912 (Gryllidæ), preoccupied by *Scottia* Brady & Norman, 1889 (Crustacea), re-named **Scottiola**, n. n.

Scudderia Stål, 1873 (Tettigoniidæ), is a homonym of *Scudderia* Grote, 1873 (Lepidoptera), but probably has priority over it, since Stål's paper was read to the Swedish Academy on 16th April, 1873, while that by Grote was published in August, 1873. Therefore no new name for Stål's genus is required, unless it can be proved that the respective part of the Swedish journal appeared after August, 1873.

Servillia Blanchard, 1851 (Gryllacrididæ), is preoccupied by *Servillia* Robineau-Desvoidy, 1830 (Diptera), but a later synonym, *Heteromallus* Brunner, 1888, is available for the genus (see Karny, Gen. Insect., 206 fasc., 1937, p. 237).

Sjostedtia I. Bolivar, 1909 (Acrididæ), should be regarded as an obvious mis-spelling (or a typographical error) for *Sjœstedtia*, since the latter transcription was used by the same author twice in a later paper (Trab. Mus. Cien. Nat. Madrid, Zool., no. 20, 1914, pp. 73, 76). The name is preoccupied by *Sjœstedtia* Konow, 1907 (Hymenoptera), and I. Bolivar's genus is now re-named **Sikkimiana**, n. n.

Sphærium Charpentier, 1825 (Gryllidæ), is preoccupied by *Sphærium* Scopoli, 1777 (Mollusca), but no new name is required, since a later synonym, *Myrmecophila* Latreille, 1829, is used for the genus.

Sphingonothus Fieber, 1852 (Acrididæ), is obviously a mis-spelling (or a typographical error) for *Sphingonotus*, since the latter transcription was used by Fieber in 1853 and by all subsequent authors.

Spectrum Stoll, 1787 (Phasmidæ), is preoccupied by *Spectrum* Scopoli, 1777 (Lepidoptera). Stoll's generic name is, however, not valid in my opinion, since it was used (Natuur. Afbeeld. Beschr. etc., Introduction, p. 3) in a portion of the work where no binary nomenclature is employed, while in the list of illustrations, where binary names are used, the name *Spectrum* does not appear and is replaced by *Phasma*. Therefore no new name for *Spectrum* Stoll is required.

Sthenaropoda Karsch, 1892 (Tettigoniidæ), preoccupied by *Sthenaropoda* Brongniart, 1885 (Protorthoptera), re-named **Afromecopoda**, n. n.

Strophia Stål, 1877 (Gryllidæ), preoccupied by *Strophia* Albers, 1850 (Mollusca), and by *Strophia* Meigen, 1832 (Lepidoptera), re-named **Strophiola**, n. n.

Tænionema I. Bolivar, 1906 (Phasmidæ), preoccupied by *Tænionema* Banks, 1905 (Plecoptera), re-named **Tæniophasma**, n. n.

Tepperia Kirby, 1910 (Blattidæ), preoccupied by *Tepperia* Lea, 1903 (Coleoptera), re-named **Tepperiana**, n. n.

Tropidonotus Serville, 1831 (Acrididæ), is preoccupied by *Tropidonotus* Kuhl, 1826 (Reptilia), and its emendation *Tropinotus* Serville, 1839, is preoccupied by *Tropinotus* Kuhl & Hasselt, 1822 (Reptilia), but the name *Xyleus* Gistl, 1848, has been proposed to replace *Tropinotus* Serv. as incorrectly formed, and this becomes a valid name for the genus, with *Tropeonotus* Saussure, 1861, and *Diedronotus* I. Bolivar, 1906, as synonyms (*synn. n. n.*).

Voeltzkowia Saussure, 1899 (Gryllidæ), preoccupied by *Voeltzkowia* Boettger, 1893 (Reptilia), re-named **Malgasia**, n. n.

Xanthomantis Giglio-Tos, 1915 (Mantidæ), is preoccupied by *Xanthomantis* Warren, 1909 (Lepidoptera), but *Pliacanthopus* Giglio-Tos, 1927, is a synonym (according to Beier, Gen. Ins.. 203 fasc., Mantidæ, p. 60) and available for the genus.

Xenica Brunner, 1891 (Tettigoniidæ), preoccupied by *Xenica* Westwood, 1851 (Lepidoptera), re-named **Xenicola**, n. n.

Xenophasma Redtenbacher, 1908 (Phasmidæ), preoccupied by *Xenophasma* Dognin, 1905 (Lepidoptera), re-named **Xenophasmina**, n. n.

Addenda.

1. I have proposed a new name, *Dicellurina* Uvarov (Ann. & Mag. Nat. Hist. ser. 11, vol. v. 1940, p. 173), for *Dicellura* Rehn & Hebard, 1915 (*nec* Haliday, 1865), but the genus has already been renamed *Dicellurina* Rehn & Hebard, 1938 (Entomol. News, May, 1938, p. 150), and my name sinks as a homonym and a synonym. I am grateful to Mr. James Rehn for drawing my attention to this oversight on my part.

2. *Philodontomacha* Uvarov, 1940 (Ann. & Mag. Nat. Hist. ser. 11, vol. vi. p. 115), is a synonym (*syn. n.*) of *Myrmoblattina* Chopard, 1926 ('Entomologist,' vol. lix. p. 52, footnote), as both names were proposed to replace

the preoccupied *Phileciton* Chopard, 1924 (the spelling *Philection* in my paper, *l. c.*, is due to a typographical error).

3. The paragraph 20 of the Report of the Permanent Commission of Zoological Nomenclature (XII^e Congr. Intern. Zool., Lisbonne, vol. i. p. 186) requires that a definite bibliographical reference should be given to each name replaced by a new one. No individual references of this kind were given by me in the series of papers now concluded, since, as stated in the first paper, the work is based on the 'Nomenclator Zoologicus' by S. A. Neave, vols. i.–iv., London, 1939–40, where the required references will be found. This statement is made in order to prevent my new names from being invalidated through a narrow-minded literal application of the paragraph referred to above.

XXXIX.—*Australian* Buprestidæ *and the Junk Catalogue*.

By H. J. Carter, B.A., F.E.S.[*]

The work of cataloguing the Buprestidæ of the world is so complex that some inaccuracies may be overlooked as venial. Since, however, the monumental undertaking of Messrs. Junk and S. Schenkling must for many years stand as the chief authority on nomenclature in the Coleoptera, it is reasonable to expect scientific accuracy of a high order and scientific reticence in cases of doubtful validity. In the volumes on Buprestidæ, edited by Dr. Obenberger—at least where Australian species are concerned—the inaccuracies are so frequent and flagrant that it has been considered necessary to publish the following notes to help future Australian students. This motive alone is responsible for criticisms by one who has had exceptional opportunities to study types in the museums of Europe and Australia—especially in a thirty-five days' close study at the British Museum of Natural

[*] Died 16th April, 1940.

History in 1922. This, combined with a lifetime of field-work and friendship with colleagues of that ilk, impels me to do what I can towards rendering a valuable work still more valuable.

The exhumation by Dr. Obenberger of the unpublished paper " Buprestidæ " as a valid authority, after its decent burial above sixty years ago by the Entomological Society of London, adds confusion to what is already a sufficiently confusing literature. (For the full discussion of this paper see Proc. Ent. Soc. Lond. 1867, pp. cix, cx.) Dr. Obenberger follows other authors in misquoting its title. It is unpublished, since it lacks an author's name, date, place, and printer ; was never for sale, and, in many cases, there is nothing to show that the insects named therein were Australian. A specimen is in the library of the Linnean Society of New South Wales, of which I possess a copy.

With names taken from persons there is much to be said for their use as adjectival, with a small letter, *e. g.*, *Stigmodera hopei*, but Dr. Obenberger employs capitals for adjectival place names, which is surely indefensible, e. g., *Stigmodera Bogania*, *S. Callubriensis*. Locality Australia. This is one of the bugbears of Australian entomologists, yet it occurs here, even when the exact locality has been published in the description, *e. g.*, *Stigmodera quadriplagiata*. The following are corrections or suggestions :—

PROSPHERES (indexed as PROPHERES).

decemnotatus C. & G. omitted, under ***aurantiopictus*** C. & G.
discoideus C. & G. omitted (Mon. i. p. 130, t. 33, f. 180).

CASTALIA.

scintillans Cart. is, I think, a ***Polycestella***.

CYRIA.

tridens Blkb.=***australis*** Boisd. var. (At Coff's Harbour, N.S.W., and Stanthorpe Q., both black and patterned forms occur in company, with intermediate gradations.)

PARACUPTA.

albivittis Hope should be *Iridotænia albivittis*, with locality, N.S.W., Victoria, Tasmania.

bellicosa Blkb. should be *Iridotænia bellicosa* = *I. terræreginæ* Obenb.

CHRYSODEMA.

aurofoveata Guér., N. Australia omitted from the locality list.

CHALCOTÆNIA.

boucardi Thér. = *quadriimpressa* Waterh.

frenchi Blkb., omitted (Trans. Roy. Soc. S. Aust. 1891, p. 136).

EURYSPILUS.

strandi Obenb. = *australis* Blkb.

BUBASTES.

Until the types of the seventeen species named by Obenberger can be examined no clear idea of the genus is possible. Evident synonymy and inaccuracies in his work are indicated in Proc. Linn. Soc. N.S.W. 1924, pp. 527–528. Two characters on which the author relied for distinction—forehead convex or flat and the elytral apices—are unreliable and vary in the same species.

Sphenoptera australis C. & G. The inclusion of this under *Bubastes* can only be a guess. The dimensions (5 × ¾ lines) scarcely permits this. It is probably a *Euryspilus*.

CINYRA.

spilota Hope is placed under this American genus. It is, almost certainly, a *Cisseis* (? = *signaticollis* Hope).

CASTELNAUDINA = NEOBUBASTES.

australasiæ Obenb. ? = *aureocincta* Blkb.

NEOTORRESITA = PSEUDANILARA.

The repetition of this mistake—first noted in Proc. Linn. Soc. N.S.W. 1924, p. 526, and more fully discussed in

Entom. Blätt. 1929, p. 183—is disguised by placing these names 128 pages apart. The mistake is emphasized by including *cupripes* Macl. under *Neotorresita* and *purpureicollis* Macl. under *Pseudanilara* that are sometimes difficult to distinguish as species.

DICEROPYGUS.

quadritinctus Obenb. ? =*maculatus* Deyr.

BRISEIS.

acuminata Kerr. =*sagitta* Obenb. =*conica* C. & G.
elongata Cart. =*prolongata* Obenb.
cuprea Cart. ? =*smaragdifrons* Obenb.
obscurata Obenb. ? =*curta* Kerr.

ANTHAXIA.

The unique record of an Australian species (*novæhollandiæ* Obenb.) needs confirmation.

ANILARA.

Until the types of the ten species described by Obenberger can be examined this genus cannot be elucidated. This uncertainty is intensified by the editor's confusion of Macleay's two species, restated as follows :—

obscura Macl. (*Melobasis*) (p. 241)
=*platessa* Thoms.
=*soror* Blkb.
=*uniformis* Kerr.
=*deyrollei* Kerr. (nec Thoms.).
=*deplanata* Théry.
? =*australis* Théry.

obscura Macl. (*Anthaxia*) (p. 242) =*viridula* Kerr. (The redundant name *Macleayi* Cart. should be omitted.)
olivia Cart. is not identical with *viridula* Kerr. (*vide* Ent. Blätt. 1929, p. 184).
tasmanica Kerr. =*sulcicollis* Kerr.
deyrollei Thoms. =*adelaidæ* Hope.

NOTOGRAPHUS = ? ANTHAXOSCHEMA Ob.

thomsoni Obenb. = *uniformis* Macl.
= ? *terræreginæ* Ob. (*Anthaxoschema*).
adelaidina Kerr. (nec Hope) is a nom. nud., probably a misprint for *adelaidæ* Hope.

NEOCUROPSIS = CURIS (*vide* Proc. Linn. Soc. N.S.W. p. 531, 1924).

NEOCURIS.

Eleven species are so inadequately described by Obenberger as to be difficult to recognize. Probably four of them are forms of the common *gracilis* Macl.

luteitincta Obenb. = *browni* Cart.
pilosula Obenb. = *cœrulans* Fairm.
Hoscheki Obenb. = *ornata* Cart.
indigacea Obenb. ? = *cuprilatera* Fairm.

CHRYSOBOTHRIS.

Blackburni Obenb. = *mastersi* Macl.
Hopei Obenb. = *Saundersi* Macl.
Odewahni Obenb. = *australasiæ* C. & G. (The text-figure shows the apical sternite as typical.)

MERIMNA.

atrata Hope = *corporaali* Obenb.

STIGMODERA.

The great variation in size and colour—in the latter case sometimes sexual—adds many difficulties in determining the numerous species of this genus. Few collections exist with accurate name-labels. An experience of many years brings continual modifications as to the affinities of species. Thus my first tabulation (Trans. Roy. Soc. S. Aust. 1916) was greatly modified in my retabulation of *Castiarina* (Aust. Zool. 1931), which represents my present idea of that group. The following experience of the writer indicates the value of field-work. During three seasons' collecting near Mullaley, N.S.W., many examples of a *Castiarina* were taken, clearly of the same variable species, in which the elytral colour varied from concolorous yellow to a bifasciate dark pattern on a yellow ground, with many intermediate gradations, in which the fasciæ were reduced to broken lines or spots. Again, in the Stanthorpe district of S. Queensland Mr. E. Sutton took a similar series that were clearly only variations of my Mullaley species, but with this constant distinction: the prothorax was bright brassy or golden in the Stanthorpe series, those from Mullaley having this segment a darker shade of coppery purple, described by Kerremans as "violace pourpre a reflets cuivreux." Both series have been compared with types, so that I was convinced that the following names belong to one variable species: *fulviventris* Macl., *straminea* Macl., *ochreiventris* Saund., *cara* Blkb., *guttigera* Blkb., *addenda* Kerr., *placens* Kerr., *johannæ* Théry. Of these the first, third, fourth, fifth might be separated from the second, sixth, seventh, eighth as subspecies, a term only properly applicable to a variation that is constant in a special region.

Most of the synonyms noted below have been published. Of these a minority have been acknowledged in the catalogue; the great majority still clog the lists. In my revisions of the larger genera the plethora of names, due to uncoordinated or irresponsible work and disregard of variation, has been noted. In *Melobasis* 110 names were reduced to 50, in *Stigmodera* 522 names had been used for 318 species. In these instances the majority of types were examined. By irresponsible work I mean inadequate descriptions, omission of important characters, or, most important of all, the omission of a note to indicate the relation of the species to its nearest allies. Three regrettable elements in vol. iii., under *Stigmodera*, greatly diminish its value to the student.

(*a*) The resuscitation of the justly long-buried pamphlet 'Buprestidæ' mentioned above, since the names from the classic monograph of Laporte and Gory—long and correctly held as valid—superseded most of the names in Hope's invalid list. It is unlikely that museums will alter their name-labels to accord with this ill-judged action. The editor is, moreover, inconsistent, since (*e. g.*)

he allows *Calodema* (*Stigmodera*) *Kirbyi* Hope to replace *C. regalis* C. & G., but retains *S. Kirbyi* Guér. (p. 714), one of which names must be sunk. With consistent inaccuracy he places "sine descr." on p. 751, whereas in Hope's offending pamphlet, under *S. Kirbyi*, No. 14, occurs, in almost identical Latin, the description published by him in the Coleopterist's Manual, 1840, p. 173, of *Calodema Kirbii* (sic).

(*b*) The non-use of the readily recognizable subgenera *Stigmodera* s. s., *Themognatha*, and *Castiarina*, which by a convenient division of this large group lessen proportionally the difficulties attending nomenclature.

(*c*) The unnecessary addition of varietal names and so-called aberrations, in a manner that bears little meaning, takes up valuable space, and can only bemuse the student.

acutangula Obenb. =*equina* Blkb.
alternozona Thoms. =*cupricollis* Saund. var.
amphichroa Boisd. The synonym *Sieboldi* C. & G. is omitted.
apicalis Hope is a nomen nudum.
    trifasciata C. & G. is a good species.
    tacita Kerr. =*obscuripennis* Saund.
perlonga Cart. is not =*atricollis* Saund.
auricollis Thoms., *planata* Cart. There is a mass of confusion here :—

(1) *pallidipennis* Blkb. is a good species.

(2) *guttata* Blkb., *minor* Blkb., *strigata* Macl., *ochreiventris* Saund., are not synonyms of *auricollis* Thoms., and represent three different species (*vide* Aust. Zool. 1931, p. 350).

(3) Names prefixed by " ab " should be omitted.

bazilisca Obenb. =*simulata* C. & G.
bifasciata Obenb. is a misspelling of *bifasciatella* Obenb.
bizonata Obenb. =*secularis* Thoms.
Hopei Saund. is a good species.
Carteri Obenb. =*sexguttata* Macl.
circumflexa Obenb. =*flavosignata* Macl.
cyanicollis Boisd. =*scalaris* Boisd.
čičerini Obenb. =*erythromelas* Boisd.
parva Saund. is not =*decemguttata* Gory.

cancellata Boisd. (1835), p. 689.
Dejeaniana Boisd. (1835), p. 698.
cancellata Don. (1805), p. 698.

There is a great confusion here. *cancellata* Don. has long been correctly catalogued as valid, with *Dejeaniana* Boisd. as a synonym. It is quoted by Boisduval as from "Donov. Epit. of the ins of New-Holl." As in other instances, the same species is redescribed under *Dejeaniana* in great detail, with the inclusion of "il se rapproche beaucoup du *cancellata*."

deserti Blkb. =*atricollis* Saund. var.
desperata Obenb. =*excisicollis* Macl.
dorsalis Obenb. =*dimidiata* Cart.
dryadula Cart. Locality should be New Guinea, not Queensland.
duponti Boisd. =*flavocincta* C. & G.
fasciosa Obenb. =*dimidiata* Cart.
felix Kerr. =*carminea* Saund.
fossithorax Obenb. =*spinolæ* C. & G. var.
gebhardti Obenb. =*tacita* Kerr.
Helenæ Hope =*simulata* C. & G.
hostilis Blkb. =*Burchelli* C. & G.
Jakovlevi Obenb. =*sanguineocincta* Saund.
miranda Cart. =*ducalis* Cart var.
modesta Obenb. =*venusta* Cart.
montigena Oke =*flavopurpurea* Cart.
Mrazi Obenb. =*Donovani* C. & G.
Nickerli Obenb. *maculiventris* Macl (♀).
obliquefasciata Obenb. = *violacea* Macl.
opacula Obenb. =*carinata* Macl.
parallelipennis, n. n.
parallela Saund.

parallelipennis is redundant, since *croceipennis* C. & G. =*parallela* Saund. *parallela* White = *elongatula* Macl. *xanthospilosa* Hope = *splendida* Géhin.

Parryi Hope =*fusca* Saund. The name *Parryi* is preoccupied by *Nascio* (*Stigmodera*) *Parryi* Hope.
quadriplagiata Cart. Correct locality Bowen, Queensland.
queenslandica Obenb. =*fusca* Saund. var.

sagittaria C. & G., distinct from *gravis* Har. and *tacita* Kerr. by its trispinose apices.
saundersiana Obenb. = ? *campestris* Blkb.
Semenovi Obenb. =*dispar* Blkb.
variopicta Thoms. is not =*semicincta*, but a good species.
Sieboldi C. & G. =*amphichroa* Boisd.
simulata Hope, nom. nud. =*simulata* C. & G. with a numerous synonymy.
splendida Hope, nom. nud.
Strandiella Obenb., *Strandi*, Obenb. =*maculiventris* Macl. (♂).
variata Kerr. =*sexplagiata* C. & G.
yilgarni Obenb. =*pallidiventris* C. & G.
yorkensis Obenb. ? a dark or stained example of *æraticollis* Cart. The locality in the description is Yorktown—a nomen nudum in Australian geography. There is a town York in W.A., a more likely habitat than Cape York as now given. (These localities are some 2000 miles apart.)
Calodema (*Stigmodera*) *Kirbyi* Hope, name preoccupied by Guérin =*C. regalis* C. & G.

PARACEPHALA.

crassa Kerr. = ? *intermedia* Kerr.
pistacina Hope (*Agrilus*) =*canaliculata* Germ. (*fide* Saunders).
=*minuta* Kerr. (Type examined by me.)
impressicollis Obenb. =*transsecta* Cart.
Strandi Obenb. = ? *niveiventris* Obenb.
murina Thoms. =*ænea* Blkb.
=*cylindrica* Kerr.

ALCINOUS.

nodosus Kerr. =*minor* Kerr.

CISSEIS.

Neospades and *Pachycisseis* should be retained as subgenera, as having well-defined characters and as a convenient subdivision of an unwieldy group.

abdominalis Hope. (*Diphucrania*) nom. nud. (Type lost, *fide* Saund.)

acuducta Kirby. Name valid, since *lata* Hope invalid.
Carteri Obenb. = *elliptica* Cart.
collaris Kerr. = *vicina* Kerr.
= *ornata* Kerr.
irrorata Hope, nom. nud. = *marmorata* C. & G.
squamulata Macl., nom. nud. (nondescript).
pauperula Kerr. (p. 852) = *maculata* C. & G. (see p. 849).
semiscabrosa Thoms. = *chrysopygia* Germ.
Hypocisseis Thoms. = *Cisseoides* Kerr.
= *Maschalix* Waterh.

ETHON.

aurifluum Hope, nom. nud. = *affine* C. & G.
Reichei Chev. There is a doubt as to the priority of this; *affine* C. & G. has long been accepted.
subfasciatum Hope, nom. nud.

AGRILUS.

australasiæ C. & G. = *hypoleucus* C. & G. = *assimilis* Hope = *flavotæniatus* Thoms. = *purpuratus* Hope = *Cooki*, Obenb. = *tasmanicus* Obenb. = *Daneši* Obenb. = *Domini* Obenb. = *Raphelisi* Obenb. = *Van Diemeni* Obenb.
Korenskyi Obenb. = *nitidus* Kerr. = *kurandæ* Obenb.

APHANISTICUS.

albohirtus Cart. has been transferred to *Synechocera*.

HABROLOMA.

hackeri Obenb. = *frenchi* V. d. Poll.

MAORAXIA.

novæzeelandiæ Obenb. = *eremita* White.
Strandi Obenb. The description is not available, but, as with *Anilara acutipenmis* Théry, corroborative evidence is necessary before additions to the Buprestid fauna of New Zealand can be accepted. Erroneous place-labels in European museums are of frequent occurrence.

XL.—*Notes on the Plectognath Fishes.*—IV. *Sexual Dimorphism in the Family* Ostraciontidæ. By A. Fraser-Brunner.

Throughout the order Plectognathi sexual dimorphism is more or less apparent. It appears somewhat erratically, sometimes being strongly marked throughout a genus though scarcely discernible in other closely related genera, sometimes characterizing odd species within a genus. The family Monacanthidæ contains numerous examples, ranging from a simple difference in the depth of the body to a very distinct divergence in form and pattern, so strong in a few cases that the sexes have been thought to be distinct species. An example of this was indicated recently by Ebina *, who described and figured the sexual dimorphism in *Monacanthus modestus* Günther; but he omitted to remark that the female had been regarded as a distinct species, *M. septentrionalis*. Similarly, in the family Balistidæ, Tanaka † described two species of *Xanthichthys* which he later recognized as the sexes of a previously known form, *X. lineopunctatus* (Hollard).

Quite the most striking differences, however, are to be found between the sexes in certain species of the family Ostraciontidæ. Hitherto the only reference to this has been that by Saville Kent, in his 'Naturalist in Australia,' in which he describes the difference in coloration (p. 150), and gives a somewhat crude coloured plate, in which, however, it is possible to recognize the two "species" of *Aracana* known as *A. spilogaster* (Richardson) and *A. aurita* (Shaw). Subsequent authors have not given Kent's work serious consideration, despite his statement that he had dissected a number of fresh specimens; but after a careful study of the material at my disposal I am convinced that *A. spilogaster* is, in fact, the male and *A. aurita* the female of a single species, for which the earliest name is *Aracana aurita* (Shaw).

The difference between the sexes consists principally in that the adult male is more compressed, has a more convex snout, and has the pattern of longitudinal stripes more or less broken up into spots.

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* K. Ebina, 1932, Journ. Imp. Fish. Tokyo, xxvii. no. 1, p. 15, figs. 1–3.

† S. Tanaka, 1931, Journ. Fac. Sci. Imp. Univ. Tokyo, iii. p. 5, pl. ii.

Significantly, the other two "species" of the genus differ from each other in these same respects, and agree with each other in the characters by which they differ from *A. aurita.* On this basis I have no hesitation in recognizing *A. flavigaster* Gray as the female of *A. ornata* Gray, although I have been unable to determine the sex of the few specimens at my disposal.

Of the rest of this family, the only other genus in which strongly marked dimorphism can be shown to occur is *Ostracion* * itself, and here it has not previously been recognized. Indeed, I had worked for a considerable time on the various "species" before being led to suspect that dimorphism existed.

When examining the specimens of *Ostracion cyanurus* Rüppell, a species from the Persian Gulf and Red Sea, in the British Museum (Nat. Hist.) I found that they represented two forms which, while agreeing in general proportions and in the main features of pattern (both, for example, differ from all the other forms of this genus † in having the back plain and a pattern of dark spots or ocelli on a pale ground), yet differed from each other so noticeably that they might have been regarded as distinct species. I was unwilling to take the latter view on account of the limited range of the species and the fact that they resembled each other in the characters by which they differed from all the others. I therefore examined the gonads, and found that they supported the supposition that these two forms were the sexes of one species. The differences are:—Male: snout convex; no spots on snout or cheeks; ocelli on sides. Female: snout concave; dark spots on snout, cheeks, and sides; the latter not ocellated (see figure).

From this it was but a step to the realization that these differences were equivalent to those between the well-known *O. sebæ* and *O. lentiginosus* (*punctatus*). Both are dark forms with white spots on back, are similarly proportioned, and have the same geographical range. *O. sebæ* has a convex snout without spots, and ocelli on the side of the body, while *O. lentiginosus* has a concave snout with white spots similar to those on the side. Dissection of a number of specimens confirms the inference that *O. sebæ* Bleeker is, in fact, the male form of *O. lentiginosus* Bloch & Schneider.

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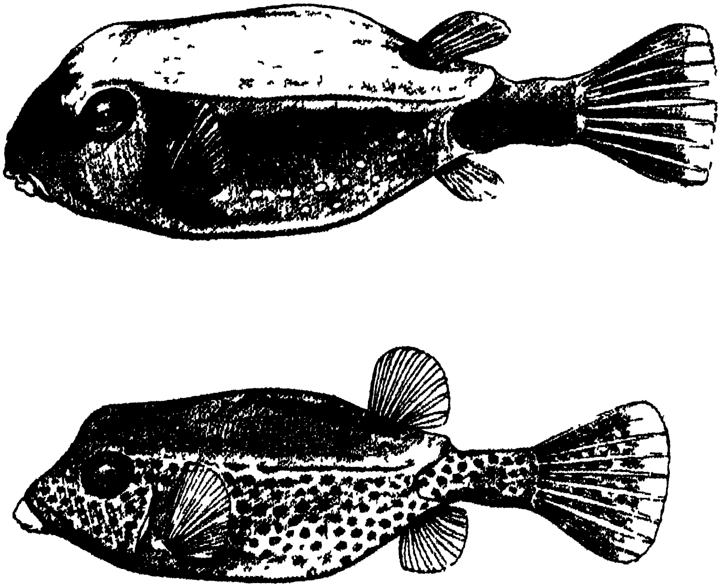
* For definition of this genus as here understood see previous paper of this series (Ann. & Mag. Nat. Hist. 1935, ser. 10, xvi. pp. 314–320).

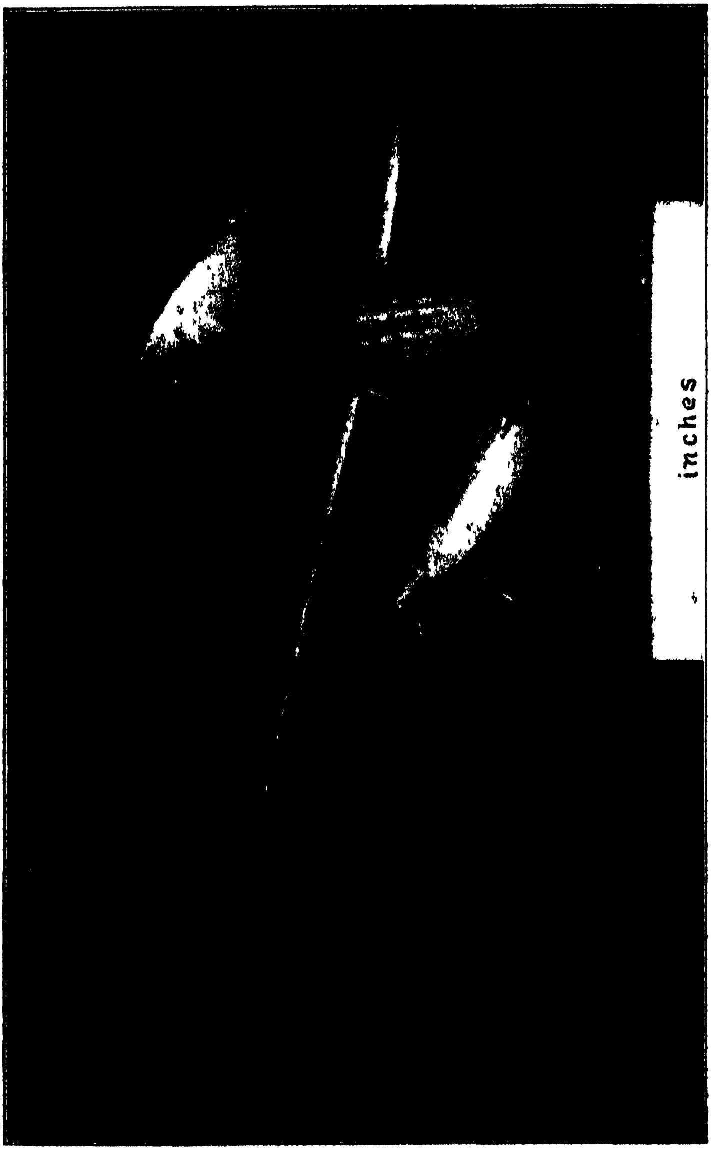
† Except *O. tuberculatus*, which is distinct in other respects.

Of the remaining members of the genus, two others can be paired in the same way—*Ostracion solorensis* Bleeker being the female of *O. renardi* Bleeker. This species is distinguished proportionally and by longitudinal bands on the upper part of the sides, the back being minutely punctulated with bluish white. Here, again, the male has a convex, plain snout and ocelli on the sides, the female a concave, spotted snout but reticulations on the sides.



Ostracion cyanurus (× ½).
Male above, female below.

The only other species, *O. tuberculatus* L., does not exhibit such strong dimorphism.



Pirmeda tenmalaia, gen. et sp. n., ♂ and ♀ (living).

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XLI.—*A Synopsis of the Bolivian Species of* Cyllœpus *Er.* (*Coleoptera*, Elmidæ). By H. E. HINTON, Ph.D., Department of Entomology, British Museum (Natural History).

Two Bolivian species of Elmidæ have been referred to the genus *Cyllœpus*. Of these one, *Cyllœpus germaini* Grouv. (1896) has been transferred to the genus *Elsianus* Sharp by Hinton (1936). In this paper five additional species are recorded from Bolivia, thus bringing the total up to six, as follows:—

(1)	*Cyllœpus punctatus*, sp. n.	3
(2)	,, *ventralis*, sp. n.	1
(3)	,, *tuberculatus*, sp. n.	6
(4)	,, *sparsus*, sp. n.	2
(5)	,, *consobrinus* Grouv.	190
(6)	,, *vicinus*, sp. n.	10
	Total number of specimens examined.	212

Both in general appearance and structural details these, as well as all known species of western South American *Cyllœpus*, are much more closely related to those of Central America and Mexico than to those of Brazil.

This is of particular interest in view of the fact that all Bolivian species known to-day occur in the Amazon watershed, though none have been recorded below the 1000 metre level.

All drawings were made with the aid of a camera lucida; and lines next to figures refer to a length of 0·20 mm.

A Key to the Bolivian Species of Cylloepus.

1. Pronotum with sublateral carinæ feebly developed and absent on basal fourth; median longitudinal impression a fifth as long as pronotum. Yungas Valley (Chaco) .... *C. punctatus*, sp. n.

   Pronotum with sublateral carinæ strongly raised and extending to base; median longitudinal impression a third as long as pronotum or nearly complete .... 2.

2. Middle of pronotal disk on basal fourth without a longitudinal impression and very strongly gibbous. Elytra with second interval near base flat. Female with a large, acute tooth on each side of middle of metasternum near posterior margin. Yungas Valley (Chulumani) .... *C. ventralis*, sp. n.

   Middle of pronotal disk on basal fourth with a median longitudinal impression (except in a few individuals of *C. vicinus*, sp. n.) or with raised portion flat, never gibbous. Elytra with second interval near base feebly to moderately convex. Female without metasternal teeth .... 3.

3. Antennæ unicolorous. Middle of pronotal disk densely tuberculate. Yungas Valley (Chulumani, Puente de la Via)........... *C. tuberculatus*, sp. n.

   Antennæ bicoloured, with two basal segments distinctly paler than others. Middle of pronotal disk punctate .... 4.

4. Middle of pronotal disk on each side of median impression with punctures as fine or slightly finer than facets of eyes and separated by one to two diameters. Male with apical segment of labial palp not broadened. Yungas Valley (Chulumani, Puente de la Via) .... *C. sparsus*, sp. n.

   Middle of pronotal disk on each side of median impression with punctures distinctly coarser than facets of eyes and frequently confluent, seldom separated by as much as one diameter. Male with last segment of labial palp very much broadened at apex .... 5.

5. Male with parameres feebly narrowed towards apex and only very feebly curved inwards at apex; median lobe strongly dilated and compressed laterally. Cochabamba,

Yungas Valley (Chaco, Puente de la Via, [(1896).
Chulumani) .... *C. consobrinus* Grouv.
Male with parameres strongly narrowed towards apex and at apex strongly curved inwards; median lobe not dilated and not laterally compressed. Yungas Valley (Chulumani) .... *C. vicinus*, sp. n.

Cyllœpus punctatus, sp. n.

Female. Length, 4·6 mm.; breadth, 1·64 mm.

Subparallel, moderately convex. Cuticle shining, dark rufo-piceous; pronotum and most of head black; two basal segments of antennæ, mouth-parts, and tarsi paler rufo-piceous. *Head* with a broad, shallow impression on middle just behind eyes; surface with round granules about as coarse as facets of eyes and separated by one to two diameters; surface between granules alutaceous and densely, microscopically punctate. Clypeus with fronto-clypeal suture deep, distinct, and so formed that anterior margin of head is feebly, arcuately emarginate for its entire breadth; anterior margin moderately deeply emarginate for its entire breadth, and angle on each side very broadly rounded; surface sculptured like head, but with the granules on anterior half at middle and anterior third at sides usually replaced by punctures slightly finer than facets of eyes; from each granule (as is generally the case elsewhere) arises a fine, recumbent seta about two to three times as long as its respective granule. Labrum with anterior margin feebly rounded and angle on each side broadly rounded; surface, except for anterior third, which is nearly smooth, without granules, but with punctures as coarse as facets of eyes and separated by one to two diameters; surface between coarse punctures with numerous microscopic punctures. *Pronotum* with broadest point, which is at basal third, about as broad as long (1·31 mm.), and base broader than apex (1·17 mm.: 0·95 mm.). Sublateral carinæ broad, feebly raised, extending from basal fourth nearly to apex, and at basal third completely interrupted by oblique impression. Sides scarcely noticeably and very broadly sinuate before hind angles. Lateral margins regularly crenate. Disk with median longitudinal impression deep, about as long and two-thirds as broad as scutellum; impression at base on each side of scutellum oval, deep, about a third as broad as scutellum, and separated by slightly more than breadth of scutellum ; disk in front of scutellum not elevated and not channelled ; oblique impression feeble, shallow, and present only at sides of disk. Surface with punctures slightly coarser than facets of eyes and usually separated by one and a half to two diameters : punctures on centre of disk and adjacent to depression slightly coarser and often confluent ; surface between punctures generally smooth, though at apical sides with numerous microscopic punctures ; on basal third at sides with coarse punctures finer (about one-third as coarse as facets of eyes), separated by three to five diameters, and surface between them highly polished ; sides between sublateral carinæ and lateral margins sculptured like middle region of head but with granules slightly coarser and sparser. *Elytra* more than twice as long as pronotum (3·34 mm. : 1·31 mm.) and broadest point, which is at about middle (1·64 mm.), slightly broader than broadest point across humeri. Epipleura densely tomentose except for anterior fifth and apical sixth. Lateral margins crenate like those of pronotum. Humeri moderately gibbous. Sublateral carinæ with inner slightly longer and outer distinctly more prominent near apex. Intervals with third moderately convex on basal sixth, though flat at extreme base, and fourth similarly but more shortly and slightly less strongly convex ; surface of intervals granulate like sides of pronotum near lateral margins, but at posterior two-thirds and at middle with granules only occasionally present ; everywhere finely, sparsely, indistinctly alutaceous, and with punctures similar to those of base of pronotum. Striæ shallow ; strial punctures on middle of disk round to subquadrate, half to two-thirds as broad as intervals, and separated longitudinally by one to one and a half diameters. *Scutellum* flat, subovate, longer than broad (0·219 mm. : 0·19 mm.), and surface sculptured like basal third of pronotal disk at sides, though all margins are densely, scarcely visibly (× 75) punctate. *Prosternum* with process strongly narrowed to apex but moderately narrow at apex ; surface of prosternum sculptured somewhat like head, but granules usually separated by two diameters. Hypomera with tomentum only on middle of raised ventral margin ; surface sculptured like sides of pronotum near lateral margins, but with granules slightly more prominent.

Metasternum with median longitudinal line deep, narrow, and extending to anterior fourth; disk feebly depressed on middle posterior three-fourths; surface of disk with round, flat-topped granules, which are about a fourth coarser than facets of eyes and are usually separated by one and a half diameters; surface between granules microscopically, densely asperate; granules on sides of metasternum slightly finer and more convex than those of disk. *Abdomen* with carinæ of first sternite broad, low, and extending to posterior two-fifths; anterior three-fifths of middle region of first sternite deeply depressed. Surface of sternites throughout densely, microscopically asperate; fifth sternite at sides and all of others with fine granules; middle region of four basal sternites without granules, but with punctures about a third to a half as coarse as facets of eyes and usually separated by three to four diameters.

Male.—Unknown.

Type.—A female in the collection of the British Museum (Nat. Hist.). Bolivia: Yungas Valley, Chaco, 5–7. vi. 1937 (*H. E. Hinton*).

Paratypes.—Two females with same data as above.

Variations.—In one of the specimens the entire middle of the first abdominal sternite, instead of only the anterior three-fifths, is depressed. In both paratypes the flat-topped granules of the abdominal sternites extend to middle, though they are here finer.

Comparative Notes.—This may be distinguished from all other known species of *Cyllœpus* by the fact that the sublateral pronotal carinæ do not extend to basal margin.

Cyllœpus ventralis, sp. n.

Female.—Length, 3·6 mm.; breadth, 1·45 mm.

Subparallel, moderately convex. Cuticle shining, dark rufo-piceous to black; basal two segments of antennæ, mouth-parts, and tarsi paler rufo-piceous. *Head* without distinct impressions; surface with irregular to round granules about as coarse as facets of eyes, each with a dorsal puncture which gives rise to a fine recumbent hair, and separated usually by one to two diameters; surface between granules with a few microscopic punctures and also occasionally feebly rugose. Clypeus with fronto-clypeal suture distinct, deep, nearly straight;

anterior margin moderately deeply, arcuately emarginate on middle half; angle on each side obtusely rounded; surface sculptured like middle region of head. Labrum with anterior margin feebly rounded, nearly truncate, and angle on each side broadly rounded; surface without granules, anterior third nearly smooth, and posterior two-thirds with punctures about two-thirds as coarse as facets of eyes and separated by one to three diameters. *Pronotum* with broadest point, which is at about basal two-fifths, about as broad as long (1·06 mm.), and base broader than apex (1·01 mm. : 0·76 mm.). Sides broadly, moderately sinuate before basal angles and very broadly, scarcely noticeably sinuate at apical two-fifths. Sublateral carinæ prominent (particularly on middle three-fifths), extending from base to about apical eighth, and very deeply but not completely interrupted at basal two-fifths by oblique impression. Lateral margins moderately feebly and regularly crenate except on basal fifth. Disk with median longitudinal impression deep, broader than scutellum, and extending from apical seventh to basal third; impressions near base at each side of scutellum, deep, oval, about half as broad as scutellum, and separated by slightly less than breadth of scutellum; disk in front of scutellum very strongly gibbous, the highest point being at about basal fifth; oblique impression on each side deep, broad, and not extending inwards to middle half of disk. Surface of disk with punctures slightly finer to slightly coarser than facets of eyes and confluent to separated by one diameter; surface on basal third between middle raised part and sublateral carinæ with about 15 microscopic punctures; sides between sublateral carinæ and lateral margins nearly smooth on basal sixth, but elsewhere punctate like disk, and also with a few granules as coarse as those of head. *Elytra* more than twice as long as pronotum (2·65 mm. : 1·06 mm.), and broadest point, which is at about apical two-fifths (1·45 mm.), slightly broader than broadest point across humeri. Epipleura entirely densely tomentose except for apical eighth. Sublateral carinæ with inner slightly more prominent, outer extending about 0·35 mm. nearer apex than inner. Intervals flat except for third, which is strongly convex on basal sixth, and fourth, which is very feebly convex on basal fifth though not at extreme base; surface of intervals occasionally alutaceous, with punctures half as coarse as facets of eyes and separated by three to five diameters, and at base and sides with numerous round granules as coarse or slightly coarser than facets of eyes. Striæ shallow, discal ones narrow; strial punctures on middle of disk round to subquadrate, a fourth to a half as broad as intervals, deep, and separated longitudinally by one to two diameters; towards apex discal strial punctures become much finer. *Scutellum* flat, obovate, longer than broad (0·19 mm. : 0·13 mm.), and surface with a few granules at sides. *Prosternum* when seen from side with anterior two-thirds (not including process) strongly and sharply bent ventrally; process with apex strongly rounded but moderately narrow; surface for the most part with oblong to round granules about a third coarser than facets of eyes and separated by half to three diameters. Hypomera with a slight amount of tomentum on middle of raised ventral margin; surface granulate like prosternum but more irregularly so, and also rugose between granules. Metasternum with median longitudinal line very fine and extending to anterior sixth; disk with posterior three-fifths moderately deeply depressed; on each side of middle near posterior margin with an acute tubercle about 0·05 mm. long; surface with granules about as coarse as those of prosternum, obovate, and separated by one to two diameters; granules on sides of metasternum similar to those of disk. *Abdomen* with carinæ of first sternite broad, moderately convex, and extending to posterior two-fifths of segment; anterior three-fifths of middle of first sternite moderately depressed and surface of anterior half rugose, while surface of posterior half is smooth, with a few sparse, microscopic punctures. Middle of sternites two to four sculptured as posterior half of first sternite; sides of all sternites and all of fifth granulate more finely but otherwise similarly to metasternal disk.

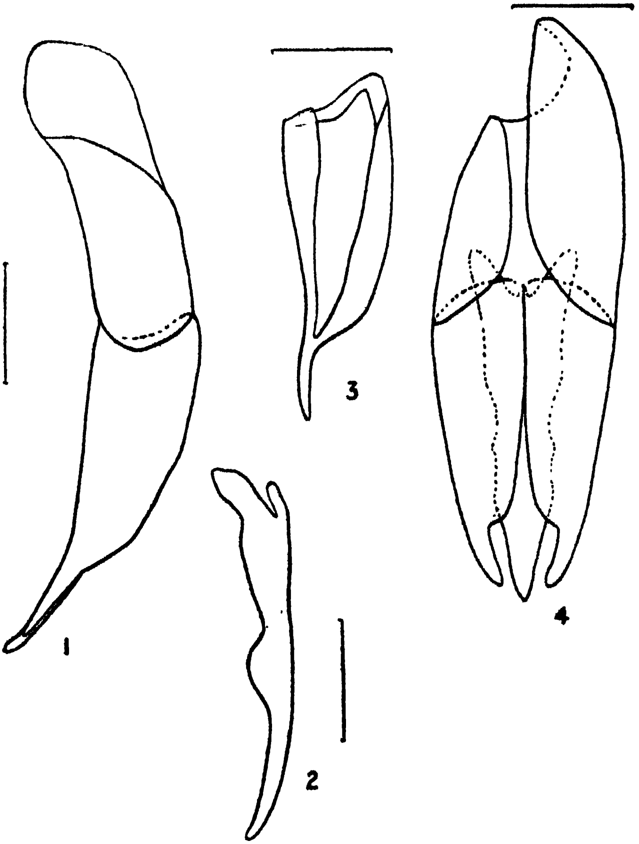
Male.—Unknown.

Type.—A female in the collection of the British Museum (Nat. Hist.). Bolivia: Yungas Valley, Chulumani, 9–10. vi. 1937 (*H. E. Hinton*).

Comparative Notes.—This may be distinguished at once from all other species by the acute tubercle on each side of the metasternal disk near the posterior margin.

Cyllœpus tuberculatus, sp. n. (Figs. 1–4.)

Male.—Length, 4·0–4·5 mm.; breadth, 1·5 mm. Subparallel, moderately convex. Cuticle shining, black to dark rufo-piceous; antennæ, mouth-parts, and tarsi paler rufo-piceous. *Head* with a broad, shallow, median



Cyllœpus tuberculatus, sp. n.
Fig. 1.—Left lateral view of male genitalia.
Fig. 2.—Left lateral view of median lobe dissected out.
Fig. 3.—Inner lateral view of paramere.
Fig. 4.—Dorsal view of male genitalia.

longitudinal impression and with a similar impression on each side before eye ; surface with irregular to round granules slightly coarser than facets of eyes and separated by one to two diameters ; surface between granules so densely, microscopically punctate that it appears asperate. Clypeus with fronto-clypeal suture deep and so formed that anterior margin of head is feebly, broadly, arcuately emarginate for its entire breadth ; angle on each side broadly rounded ; surface sculptured like head, but on middle anterior region with granules and punctures slightly sparser. Labrum with anterior margin freely rounded and angle on each side broadly rounded ; surface with punctures two-thirds as coarse as facets of eyes, separated by one to one and a half diameters, and surface between them nearly smooth ; anterior third without punctures. *Pronotum* with broadest point, which is across basal two-fifths, not quite as broad as long (1·17 mm. : 1·20 mm.) and base broader than apex (1·12 mm. : 0·82 mm.). Sides broadly, scarcely noticeably sinuate before hind angles. Lateral margins feebly, moderately regularly crenate. Sublateral carinæ prominent (particularly on middle two-thirds), extending from base to apex, and moderately feebly interrupted by oblique impression at basal two-fifths. Disk with median longitudinal impression deep, at middle as broad as scutellum, though elsewhere slightly narrower, and extending from apical sixth to basal margin ; impressions near base at each side of scutellum oval, moderately deep, about half to two-thirds as broad as scutellum, and separated by slightly more than breadth of scutellum ; disk in front of scutellum on basal third with sides of median longitudinal impression broadly convex and very prominent ; oblique impression on each side broad and very shallow. Surface on disk at middle with irregularly shaped granules slightly coarser than facets of eyes and usually separated by a fourth to two-thirds a diameter ; surface between granules finely rugose ; anterior middle fourth of disk with granules slightly sparser and surface between smooth ; surface on basal third to two-fifths, between median impression and sublateral carina, with granules separated by one to three diameters, and surface between them smooth, surface between sublateral carinæ and lateral margins granulate on posterior two-thirds like anterior middle fourth of disk, and on anterior third like middle of disk. *Elytra* more than twice as long as pronotum (3·26 mm. : 1·20 mm.) and broadest point, which is at about apical two-fifths (1·50 mm.), distinctly broader than broadest point across humeri. Epipleura entirely densely tomentose. Lateral margins crenate like sides of pronotum. Sublateral carinæ with inner more prominent on basal two-thirds, but outer more prominent apically; inner extending nearer apex than outer though here only feebly convex. Intervals with second, third, and fourth moderately strongly convex on basal fifth, and fifth feebly convex on basal seventh, though all quite flat at extreme base; surface of intervals with numerous fine punctures, occasionally feebly alutaceous, and everywhere except on middle apical three-fifths with numerous round granules slightly coarser than facets of eyes. Striæ everywhere deep and moderately broad; strial punctures on disk deep, usually round, a third to half as broad as intervals, and separated longitudinally by one and a half to two diameters. *Scutellum* flat, obovate, longer than broad (0·19 : 0·15 mm.), and surface microscopically punctate and alutaceous and with an occasional granule. *Prosternum* when seen from side with anterior two-thirds (not including process) moderately but not sharply bent ventrally; process with apex moderately strongly and narrowly rounded; surface sculptured as middle of pronotal disk, but with granules distinctly coarser and sparser; towards sides and anteriorly with granules finer and denser. Metasternum with median longitudinal line moderately narrow (about as broad as base of a claw) and extending to anterior third; disk moderately strongly depressed on posterior middle two-thirds; surface of disk with irregular to round rather flat-topped granules, which are a fourth coarser than facets of eyes and are usually separated by a half to one diameter; sides of metasternum with granules distinctly finer and slightly sparser than those of disk. *Abdomen* with carinæ of first sternite broad, moderately strongly convex, prominent, and extending nearly to posterior margin of segment; all of middle region of first sternite very strongly depressed and anterior middle half of second sternite feebly depressed. Middle of first sternite sculptured like middle of prosternum; sides of this, as well as sides and middle of other four, with granules only slightly coarser than facets of eyes, more or less flat-topped, and separated by one to two diameters; middle anterior part of fifth sternite with only an occasional much finer granule. *Genitalia* as figured (figs. 1–4).

Female.—Externally similar to male.

Type.—A male in the collection of the British Museum (Nat. Hist.). Bolivia: Yungas Valley, Puente de la Via, 12–13. vi. 1937 (*H. E. Hinton*).

Paratypes.—Three males and two females, Bolivia: Yungas Valley, Chulumani, 9–10. vi. 1937 (*H. E. Hinton*).

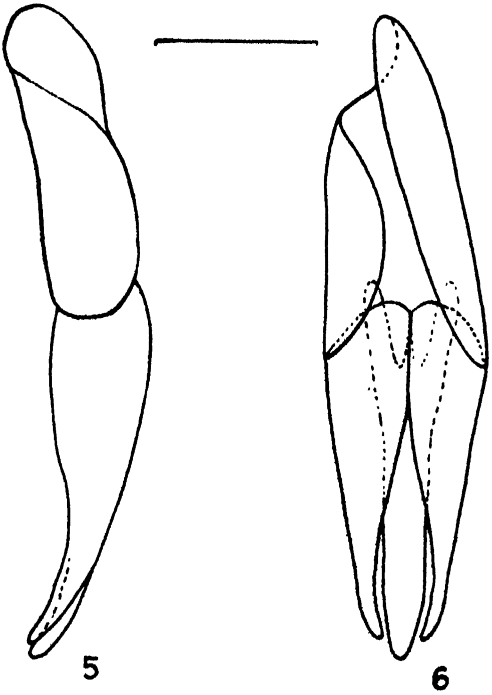
Variations.—One of the females has the metasternal disk only feebly depressed posteriorly, the middle of the first abdominal sternite scarcely noticeably depressed, and the anterior half of the middle of the second sternite convex. In this specimen the carinæ of the first abdominal sternite are very broad, feebly convex, and extend only to posterior third of segment.

Comparative Notes.—From all western South American species except *C. palpalis* Hinton it may be distinguished by its granulate instead of punctate pronotal disk. From *C. palpalis* it differs in having the second to fifth basal elytral intervals convex instead of only the third. The males of the two may be immediately distinguished by the broadened apical segment of the labial palp of *C. palpalis* and the differently formed male genitalia.

Cyllœpus sparsus, sp. n. (Figs. 5, 6.)

Male.— Length, 3·4 mm.; breadth, 1·31 mm.

Subparallel, feebly convex. Cuticle shining, moderately pale rufo-piceous; antennæ, mouth-parts and tarsi paler rufo-piceous. *Head* without distinct impressions; surface with a few indistinct, low granules about as coarse as facets of eyes; surface between granules feebly rugose and with numerous microscopic punctures. Clypeus with fronto-clypeal suture deep, nearly straight; anterior margin scarcely noticeably, arcuately emarginate for its entire breadth; angle on each side broadly rounded; surface with punctures about half as coarse as facets of eyes and usually separated by two diameters; surface between punctures nearly smooth. Labrum with anterior margin feebly rounded and angle on each side very broadly rounded; surface, except for anterior third, which is smooth, punctate like clypeus. *Pronotum* with broadest point, which is about at basal two-fifths, slightly broader than long (1·01 mm. : 0·98 mm.), and base broader than apex (0·93 mm. : 0·72 mm.). Sides nowhere distinctly sinuate. Lateral margins moderately feebly and regularly crenate. Sublateral carinæ extending from base nearly to apex, prominent (particularly on middle two-thirds),



Cyllœpus sparsus, sp. n.

Fig. 5.—Left lateral view of male genitalia.
Fig. 6.—Dorsal view of same.

and shallowly interrupted on basal two-fifths by oblique impression. Disk with median longitudinal impression extending from apical fourth to base, deep and broad at middle (half again as broad as scutellum), and posteriorly shallower and less than half as broad ; impressions near base at each side of scutellum moderately deep, oval, half to two-thirds as broad as scutellum, and separated by about breadth of scutellum ; disk in front of scutellum moderately raised and sides of impression moderately prominent ; oblique impression broad, moderately deep, and extending from near middle across sublateral carina. Surface of disk with round punctures about two-thirds as coarse as facets of eyes, and separated by one to two but usually two diameters ; surface between punctures usually smooth ; surface on bottom of broad part of median impression minutely, densely rugose ; surface between sublateral carinæ and lateral margins with a few granules as coarse as facets of eyes on anterior half, these granules also extending to surface of carinæ. *Elytra* more than twice as long as pronotum (2·24 mm. : 0·98 mm.), and broadest point, which is at apical third (1·31 mm.), slightly but distinctly broader than broadest point across humeri. Epipleura glabrous on anterior tenth, elsewhere densely tomentose. Lateral margins regularly but more feebly crenate than those of pronotum. Sublateral carinæ with outer distinctly more convex apically and extending slightly beyond inner. Intervals flat or nearly so, with two to four slightly more convex near base than others ; surface of intervals feebly, moderately densely alutaceous, punctate slightly more finely than pronotal disk, and on basal third and most of sides with numerous round, low granules about as coarse as facets of eyes. Striæ at most feebly impressed ; strial punctures on disk deep, round to subquadrate, as broad to a third again as broad as intervals, and separated longitudinally by two-thirds to one diameter. *Scutellum* flat, subovate (nearly round), slightly longer than broad (0·14 mm. : 0·13 mm.), and surface sculptured as adjacent elytral intervals. *Prosternum* with anterior half (not including process) feebly and gradually bent ventrally ; process with posterior margin broadly rounded ; surface with granules similar to those of elytral base and separated by one to four diameters ; surface between granules densely and microscopically punctate, nearly asperate. Hypomera sculptured like sides of pronotum near lateral margins, but with granules present on anterior three-fifths. Metasternum with median longitudinal impression fine, moderately deep, and extending to anterior fifth ; disk feebly depressed ; surface with obovate to round somewhat flat-topped granules slightly coarser than facets of eyes and separated by one to three diameters; surface between granules microscopically, densely asperate; sides of metasternum sculptured similarly to disk. *Abdomen* with carinæ of first segment broad, moderately convex, and extending to posterior third of segment. Middle region of first sternite moderately depressed. Surface of sternites sculptured like metasternal disk, but with granules at extreme sides, on middle of second to fourth, and on all of fifth only about half as coarse. *Genitalia* as figured (figs. 5, 6).

Female.—Unknown.

Type.—A male in the collection of the British Museum (Nat. Hist.). Bolivia: Yungas Valley, Chulumani. 9–10. vi. 1937 (*H. E. Hinton*).

Paratype.—A male, Bolivia: Yungas Valley, Puente de la Via, 12-13. vi. 1937 (*H. E. Hinton*).

Comparative Notes.—This appears to be most closely related to *C. barberi* Hinton of Guatemala and Costa Rica, but differs in having the base and sides of the elytra granulate and in having a distinct carina on the first abdominal segment. The males of *C. barberi* differ from those of *C. sparsus* in having the apical segment of the labial palp very much broadened and the genitalia differently formed.

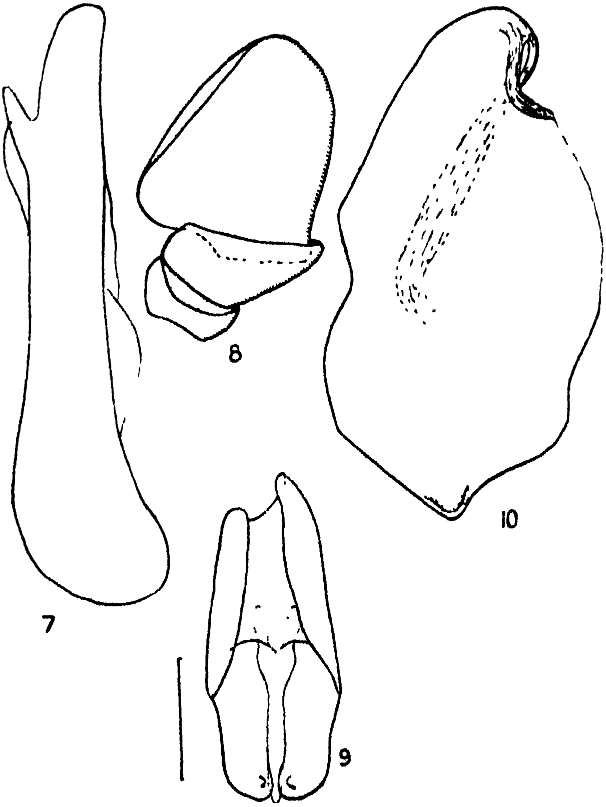
Cyllœpus consobrinus Grouv. (Figs. 7–10.)

1896. *Cyllœpus consobrinus* Grouv., Not. Leyd. Mus. xviii. pp. 42–43.

Before me is a single male of this species from the type series. As no type (holotype) has been designated in print by Grouvelle, I select as the lectotype this male from Bolivia: Cochabamba (*Germain*). It seems fairly clear from Grouvelle's notes on the variation in his series (*op. cit.* p. 43) that more than one species was before him.

The unusual genitalia of the male (very much broadened parameres and dilated and laterally compressed median lobe) will immediately distinguish it from any of its congeners.

In addition to the lectotype the following have been examined: 187, Bolivia: Yungas Valley, Chaco, 5–7. vi. 1937 (*H. E. Hinton*); one male, Bolivia; Yungas Valley, Chulumani, 9–10. vi. 1937 (*H. E. Hinton*); and one male, Bolivia: Yungas Valley, Puente de la Via, 12–13. vi. 1937 (*H. E. Hinton*).



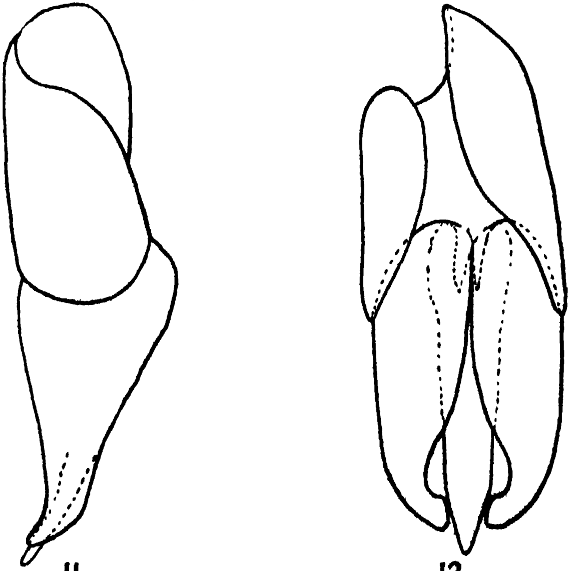
Cyllœpus consobrinus Grouv.

Fig. 7.—Right lateral view of median lobe of male genitalia dissected out.
Fig. 8.—Ventral view of right labial palp of male.
Fig. 9.—Dorsal view of male genitalia.
Fig. 10.—Lateral view of paramere.

Cyllœpus vicinus, sp. n. (Figs. 11, 12.)

Male.—Length, 3·7 mm.; breadth, 1·37 mm.

Subparallel, moderately convex. Cuticle shining, black to dark rufo-piceous; basal two segments of antennæ, mouth-parts, and tarsi paler rufo-piceous. Externally identical to *C. consobrinus* Grouv. except in the structure of the male genitalia (*cf.* figs.), which differ as follows: (1) the median lobe is evenly narrowed to apex and is not laterally compressed, but is feebly dorso-ventrally compressed, whereas in *consobrinus* the median lobe is strongly dilated and laterally compressed; and (2) the parameres, when seen dorsally, are strongly narrowed towards apex and at apex are strongly bent inwards, whereas in *consobrinus* they are very feebly narrowed towards apex and at apex are only feebly curved inwards.



Cyllœpus vicinus, sp. n.
Fig. 11.—Left lateral view of male genitalia.
Fig. 12.—Dorsal view of same.

Female.—Externally similar to male.

Type.—A male in the collection of the British Museum (Nat. Hist.). Bolivia: Yungas Valley, Chulumani, 9–10. vi. 1937 (*H. E. Hinton*).

Paratypes.—Two males with same data as above. In addition there are seven females from the same locality, but these are not designated as paratypes.

Variations.—Both a male and a female before me have the median longitudinal impression of the pronotum confined to middle third.

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HINTON, H. E. 1936. "Synonymical and other Notes on the Dryopidæ (Coleoptera)." Ent. mon. Mag. lxxii. pp. 54–58, 2 figs.

XLII.—*A List of the Type-hosts of the Mallophaga and the Lice described from them* *. By GORDON B. THOMPSON.

[Continued from Ann. & Mag. Nat. Hist. ser. 11, vol. v. p. 308.]

Order ANSERIFORMES.

Suborder *ANHIMÆ*.

Family **Anhimidæ.**

212. **Anhima cornuta** (Linn.). (Horned Screamer.)

Bothriometopus macrocnemius (Nitzsch in Burmeister), 1838. On *Palamedea cornuta.*

213. **Chauna chavaria** (Linn.). (Crested Screamer.)

Dicteisia tristis (Giebel), 1874. On *Palamedea chavaria.*

Dicteisia pilosa (Piaget), 1885. On *Chauna chavaria*, Hyslop coll.

Bothriometopus simillimus (Giebel), 1874. On *Palamedea chavaria*, Berlin [Mus.].

Suborder *ANSERES*.

Family **Anatidæ.**

Subfamily CYGNINÆ.

214. **Cygnus cygnus cygnus** (Linn.). (Mute Swan.)

Colpocephalum minutum Rudow, 1866. On *Cygnus musicus.*

Ornithobius cygni (Linn.), 1758. On *Anas cygnus.*

Ornithobius punctatus (Rudow), 1870. On *Cygnus musicus.*

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* *Note.*—It must be borne in mind when using this list that the type-hosts of the various species of Mallophaga are not fixed but only listed.

215. **Cygnus bewickii bewickii** Yarrell. (Bewick's Swan.)

Anatœcus cygni (Denny), 1842. On *Cygnus bewicki* from Ireland.

216. **Cygnus buccinator** Richardson. (Trumpeter Swan.)

Anaticola (squalida var.) pallida (Piaget), 1880, *nec Lipeurus pallidus* Giebel, 1866. On *Cygnus buccinator*, Rotterdam Zoo.

217. **Cygnus olor** (Gmelin). (Whooper Swan.)

Trinoton conspurcatum Nitzsch in Burmeister, 1839 (part; see no. 224, probably straggler). On *Cygnus olor*.

Ornithobius bucephalus (Giebel), 1874. On *Cygnus olor*.

218. **Cygnus melancoriphus** (Molina). (Black-necked Swan.)

Menopon brevithoracicum Piaget, 1880. On *Cygnus nigricollis*, Rotterdam Zoo.

219. **Chenopis atrata** (Latham). (Black Swan.)

Colpocephalum castaneum Piaget, 1885. On *Cygnus atratus*, Rotterdam Zoo.

Trinoton nigrum Le Souëf, 1902. On *Chenopis atrata* from Australia.

Ornithobius fuscus Le Souëf, 1902. Same data.

Anaticola antennata (Piaget), 1880, *nec* Giebel, 1874. On *Cygnus atratus*, Rotterdam Zoo.

Anaticola megaceros (Johnston & Harrison), 1912. On *Chenopsis atrata*.

Subfamily PLECTROPTERINÆ.

220. **Anseranas semipalmata** (Latham). (Pied Goose.)

Heteroproctus hilli Harrison, 1915. On *Anseranas semipalmata* from Northern Territory, Australia.

221. **Plectropterus gambensis gambensis** (Linn.). (Spurwing Goose.)

Menopon africanum Kellogg & Paine, 1911. On *Plectropterus gambensis* from Sudan.

Menopon tumidum Piaget, 1885. On *Plectropterus gambensis*, Leyden Mus.

Akidoproctus stenopygus Kellogg & Paine, 1911, *nec* Nitzsch, 1874. On *Plectropterus gambensis* from Sudan.

Anaticola gambensis (Piaget), 1885. On *Plectropterus gambensis*, Leyden Mus.

222. **Plectropterus gambensis niger** Sclater. (Black Spurwing Goose.)

Menopon transvaalense Bedford *, 1920. On domestic ducks (see no. 240) from Transvaal, S. Africa..

Subfamily CEREOPSINÆ.

223. **Cereopsis novæhollandiæ novæhollandiæ** Latham. (Cape Barron Goose.)

Anaticola australis (Rudow), 1869. On *Cereopsis novæhollandiæ*.

Subfamily ANSERINÆ.

224. **Anser anser** (Linn.). (Grey-lag Goose and Domestic Goose.)

Colpocephalum pectiniventre Harrison, 1916, *nom. nov.* for *Menopon pectinatum* Neumann, 1912, *nec* Osborn, 1902. On "Oie domostique."

Trinoton anserinum (Fabricius), 1805. On *Anas anser*.

Trinoton conspurcatum Nitzsch in Burmeister, 1839 (part; see no. 217). On *Anser cinereus*.

Trinoton continuum Piaget, 1880. On "Oies domestiques."

Ornithobius mathisi Neumann, 1912. On *Anser domesticus*, Indo-China, Tonkin.

Anatœcus adustus (Nitzsch in Giebel), 1861. On "Hausgans."

Anaticola anseris (Linn.), 1758. On *Anas anser*.

Anaticola † anseris (Gurlt), 1842. On "Hausgans."

Anaticola bishoppi (McGregor), 1917. On domestic goose from U.S.A., Missouri.

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* As Bedford himself sunk this as a synonym of *M. tumidum* Piaget (see no. 221), the specimens were probably stragglers from the host given here.

† Probably an *Anaticola*, described under *Ornithobius*.

225. **Anser albifrons albifrons** (Scopoli). (White-fronted Goose.)

Trinoton squalidum Denny, 1842. On *Anser albifrons* from Britain.

Anatœcus breviculatus (Giebel), 1874. On *Anser albifrons.*

Anaticola jejuna (Nitzsch in Denny), 1842. On *Anser albifrons* from Britain.

Anaticola serrata (Nitzsch in Giebel), 1866. On *Anser albifrons.*

226. **Anser albifrons gambelli** Hartlaub. (American White-fronted Goose.)

Eulæmobothrion loomisi (Kellogg & Chapman), 1902. Probably straggler. On *Anser albifrons gambeli* from U.S.A., California.

227. **Cygnopsis cygnoid** (Linn.). (Chinese Goose.)

Anatœcus brunneiceps (Giebel), 1874. On *Anser cygnoides.*

Anaticola cygnoides (Rudow), 1870. On *Cygnopsis cygnoides* from East Indies.

Anaticola cygnopsis (Rudow), 1869. Same data.

228. **Branta bernicla bernicla** (Linn.). (Brent Goose).

Philopterus dilatatior Harrison, 1916, *nom. nov.* for *Docophorus dilatatus* Piaget, 1880, *nec* Rudow, 1869. On *Bernicla brenta.*

Philopterus brevimaculatus (Piaget), 1880, *nec* Giebel, 1874. On *Bernicla brenta*, Leyden Mus. Probably straggler.

Anatœcus natatorum (Rudow), 1869 (part; see nos. 234, 259, 264). On *Bernicla torquata.*

229. **Branta leucopsis** (Bechstein). (Barnacle Goose.)

Anatœcus brunneopygus (Mjöberg), 1910. On *Anser leucopsis* from East Greenland.

Ornithobius klinkowstrœmi Mjöberg, 1910. Same data.

230. **Branta canadensis canadensis** (Linn.). (Canada Goose.)

Ornithobius atromarginatus Denny, 1842. On *Cygnus canadensis* from England.

Ornithobius goniopleurus Denny, 1842. Same data.

? Ornithobius hexophthalmus * (Nitzsch), 1861.

231. **Chloëphaga leucoptera** (Gmelin). (White-headed Goose.)

Anaticola marginella (Piaget), 1885. On *Bernicla magellanica*, Hyslop coll.

Subfamily DENDROCYGNINÆ.

232. **Dendrocygna viduata** (Linn.). (White-faced Duck.)

Trinoton aculeatum Piaget, 1885. On *Dendrocygna viduata*.

Acidoproctus bifasciatus Piaget, 1878. Described from straggler on *Dromas ardeola* in Rotterdam Zoo, subsequently identified by Piaget from *Dendrocygna viduata*, which is the true host.

Acidoproctus marginatus Piaget, 1876. Described from straggler on *Larus spinicauda* (probably from Rotterdam Zoo). Type very immature, but seems to be the same as *bifasciatus*.

Acidoproctus rostratus (Rudow), 1866. Described from straggler on *Chenalopex ægyptiacus*.

233. **Dendrocygna arborea** (Linn.). (Black-billed Tree-duck.)

Acidoproctus maximus Piagot, 1878. On *Dendrocygna arborea*, Rotterdam Zoo.

Subfamily ANATINÆ.

234. **Alopochen ægyptiaca** (Linn.). (Egyptian Goose.)

Colpocephalum africanum Ewing, 1930. On *Alopochen ægyptiacus* from Kenya.

Anatœcus natatorum (Rudow), 1869 (part; see nos. 228, 259, 264). On *Chenalopex ægyptiacus*.

Acidoproctus taschenbergi Hopkins, 1938. On *Alopochen ægyptiaca* from Uganda.

Anaticola asymmetrica † (Rudow), 1869. On *Chenalopex ægyptiacus*.

235. **Sarkidiornis melanota** (Pennant). (Knob-billed Goose.)

Anaticola colorata (Piaget), 1880. On *Anas melanotus* from Madagascar.

* Described from straggler on *Strix nyctea*—see no. 270.

† Spelt "*assymetricus*" in original.

236. **Cairina moschata** (Linn.). (Muscovy Duck.)

Acidoproctus moschatæ (Linn.), 1758. On *Anas moschata.*

Anaticola cairinensis (de Barros Netto), 1933. On *Cairina moschata* from Brazil.

237. **Tadorna tadorna** (Linn.). (Sheldrake.)

Menopon albofasciatum Piaget, 1880. On *Tadorna vulpanser* (*Anas tadorna*).

Menopon tadornæ (Gervais), 1844. On *Anas tadorna.*

Colpocephalum quadriseriatum Picaglia, 1885. On *Tadorna cornuta* from Italy.

Anaticola lactea (Giebel), 1874. On *Anas tadorna,* Rey coll.

Anaticola tadornæ (Denny), 1842. On *Anas tadorna,* Rey coll.

Anaticola tadornæ (Denny), 1842. On *Tadorna Bellonii* from Ireland.

238. **Tadorna radjah radjah** (Lesson). (White-headed Sheldrake.)

Menopon obscurum Piaget, 1880. On *Anas radjah.*

Trinoton intermedium Piaget, 1880. On *Anas radjah,* Leyden Mus.

Anaticola thoracica (Piaget), 1880. On *Anas radjah* from Halmaheira, East Indies.

239. **Anas platyrhynchos platyrhynchos** Linn. (Mallard.)

Trinoton luridum Nitzsch in Burmeister, 1838. On "Enten Arten"; figured by Giebel, 1874, from *Anas boschas.*

Anaticola anatis (J. C. Fabricius), 1798. On *Anas boschas.*

Anaticola crassicornis (Scopoli), 1763. On *Anas boschas* from Carniola, Yugoslavia.

Anaticola squalida (Nitzsch in Denny), 1842. On *Anas boschas* from Britain.

240. **Anas platyrhynchos** var. (Domestic Duck.)

Menopon transvaalense Bedford, 1920. On domestic ducks from Transvaal. Probably straggler from *Plectropterus* (see no. 222).

Philopterus kozuii Sugimoto, 1935. On domestic ducks from Formosa. (? Straggler.)

241. **Anas querquedula** Linn. (Garganey Teal.)
Trinoton querquedulæ (Linn.), 1758. On *Anas querquedula.*

242. **Anas gibberifrons gibberifrons** S. Müller. (Grey Teal.)
Anaticola (squalida var.) major (Piaget), 1880. On *Anas gibberifrons.*

243. **Anas crecca crecca** Linn. (Common Teal.)
Menopon leucoxanthum Nitzsch in Burmeister, 1838. On *Anas crecca.*
Anaticola sordida (Nitzsch), 1866 (part ; see no. 250). On *Anas crecca.*

244. **Anas formosa** Georgi. (Formosan Teal.)
Trinoton gracile Grube, 1851 (part; see nos. 245, 247). On *Anas glocitans* from Siberia.

245 **Anas falcata** Georgi. (Falcated Teal.)
Trinoton gracile Grube, 1851 (part ; see nos. 244, 247). On *Anas falcata* from Siberia.

246. **Anas brasiliensis** Gmelin. (Brazilian Teal.)
Anatœcus monteiro Pessoa & Guimarães, 1935. On *Nettium brasiliense* from Brazil.

247. **Anas acuta acuta** Linn. (Pintail.)
Trinoton gracile Grube, 1851 (part ; see nos. 244, 245).
On *Anas acuta* from Siberia.

248. **Mareca penelope** (Linn.). (Wigeon.)
Trinoton spinosum Piaget, 1880. On *Mareca penelope.*
Anaticola penelope (Müller), 1927. On *Anas penelope* from Germany.

249. **Chaulelasmus streperus** (Linn.). (Gadwall.)
Anaticola depurata (Nitzsch in Giebel), 1866. On *Anas strepera.*

250. **Spatula clypeata** (Linn.). (Shoveller Duck.)
Anatœcus ferrugineus (Giebel), 1874. On *Anas clypeata.*
Anaticola sordida (Giebel), 1866 (part ; see no. 250). On *Anas clypeata.*

251. **Aix sponsa** (Linn.). (Wood Duck.)

Anaticola lepidota (Rudow), 1869. On *Aix sponsa.*

Subfamily NYROCINÆ.

252. **Netta rufina** (Pallas). (Red-crested Pochard.)

Anatœcus icterodes (Nitzsch in Burmeister), 1838 (part ; see no. 267). On *Anas rufina.*

Acidoproctus stenopyx (Burmeister), 1838. On *Anas rufina.*

253. **Nyroca vallisneria** (Wilson). (Canvas-back Duck.)

Acidoproctus kelloggi Carriker, 1902. On *Aythya vallisneria* from Nebraska, U.S.A.

254. **Nyroca ferina** (Linn.). (Pochard.)

Anatœcus difficilis Cummings, 1916. On Pochard.

Anaticola fuligulæ (Müller), 1927. On *Fuligula ferina* from Germany.

255. **Nyroca fuligula** (Linn.). (Tufted Duck.)

Anatœcus obtusus (Giebel), 1866. On *Anas fuligula.*

256. **Nyroca australis** Eyton. (White-eyed Duck.)

Anaticola nyrocæ (Rudow), 1870, *nom. nov.* for *Lipeurus cinereus* Rudow, 1869, *nec* Nitzsch, 1866. On *Nyroca australis.*

257. **Tachyeres brachyptera** (Latham). (Racehorse or Steamer Duck.)

Anaticola breviceps (Piaget), 1888. On *Camptolæmus cinereus*, Trouessart coll.

258. **Bucephala clangula clangula** (Linn.). (Golden-Eye.)

Trinoton clangulæ (O. Fabricius), 1780. On *Anas clangula* from Greenland.

Trinoton luridum var. α Piaget, 1885. On *Anas clangula*, Amsterdam Zoo.

259. **Clangula hyemalis** (Linn.). (Long-tailed Duck.)

Anatœcus natatorum (Rudow), 1869 (part ; see nos. 228, 234). On *Platypus glacialis.*

Anaticola frater (Giebel), 1874, p. 242, *nec Lipeurus frater*, p. 210. On *Anas glacialis.*

260. **Somateria mollissima mollissima** (Linn.). (Common Eider Duck.)

Anaticola rubromaculata (Rudow), 1869. On *Platypus mollissima.*

261. **Somateria spectabilis** (Linn.). (King Eider.)

Anaticola gracilis (Giebel), 1874, *nec Lipeurus gracilis* Packard, 1870. On *Anas spectabilis.*

262. **Oidemia nigra nigra** (Linn.). (Common Scoter.)

Menopon lunarium Rudow, 1869. On *Platypus nigra.*
Anaticola angustolimbata (Giebel), 1866. On *Anas nigra.*

263. **Oidemia nigra americana** Swainson. (American Scoter.)

Trinoton minus Osborn, 1896. On Butter-bill Coot (*Oidemia*) from N. America.

264. **Melanitta fusca fusca** (Linn.). (Velvet Scoter.)

Anatœcus natatorum Rudow, 1869 (part; see nos. 228, 234, 259). On *Anas fuscus.*
Anaticola punctulata (Rudow), 1869. On *Oidemia fusca.*

265. **Melanitta fusca deglandi** (Bonaparte). (White-winged Scoter.)

Menopon loomisii Kellogg, 1896. On *Oidemia deglandi* from California, U.S.A.
Anaticola constricta (Kellogg), 1896 (part; see no. 266). Same data.

266. **Melanitta perspicillata** (Linn.). (Surf Scoter.)

Anaticola perspicillata (Kellogg), 1896 (part; see no. 265). On *Oidemia perspicillata* from Kansas, U.S.A.

Subfamily Merginæ.

267. **Mergellus albellus** (Linn.). (Smew.)

Trinoton lituratum Nitzsch in Burmeister, 1838. On *Mergus albellus.*
Anatœcus icterodes (Nitzsch in Burmeister), 1838 (part; see no. 252). On *Mergus albellus.*

268. **Mergus merganser merganser** Linn. (Goosander.)
Anatœcus bipunctata (Giebel), 1874. On *Mergus merganser*.

269. **Mergus serrator** Linn. (Red-breasted Merganser.)
Anatœcus bisetosus (Piaget), 1885. On *Mergus serrator*, Amsterdam Zoo.
Anaticola mergi (J. C. Fabricius), 1781. On *Mergus serratus*.
Anaticola mergiserrati (Degeer), 1778. On *Mergus serratus*.
Anaticola temporalis (Nitzsch in Denny), 1842. On *Mergus serrator* from Britain.

Miscellaneous ANATIDÆ.

270. **Described from stragglers,** etc.
Colpocephalum luteum Schömmer, 1913. On " Ente " from Oberfranken, Germany.
Trinoton lari Degeer, 1778. Described from straggler on " Mouëtte " (=*Larus* sp.).
Trinoton pygmæum Kolenati, 1846. Straggler on *Carbo pygmæus* from Transcaucasia.
Anaticola ewingi (Quadri), 1935. On duck, probably teal, Aligarh District, North India.
Ornithobius hexophthalmus * (Nitzsch in Giebel), 1861. On *Strix nyctea*. Either stragglers on Owl or material wrongly labelled.

XLIII.—Chloropidæ (*Diptera*) of the Oriental Region: Notes and Synonymy †. By CURTIS W. SABROSKY ‡, Michigan State College, East Lansing, Michigan.

IN the course of study of types and material from the Oriental Region in the dipterous family Chloropidæ some corrections and synonymy have been discovered, especially in certain older species whose correct identity has not hitherto been established. The lack of extensive and critical material of many genera and species precludes a monographic revision at the present time, though it is hoped that this may ultimately be produced. The notes presented here will at least clarify a few taxonomic difficulties and eliminate some names from the many which have been published.

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* See no. 230.

† Journal Article no. 402 (n. s.) from the Michigan Agricultural Experiment Station.

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CHLOROPIDÆ DESCRIBED BY FRANCIS WALKER.

Several species described by Walker from the Oriental Region have long remained *species incertæ*. The types in the British Museum have been examined, and the following notes may be published :—

Cephaloconus Walker, 1860, Journ. Linn. Soc. (Zool.) v. p. 299, and its sole species and genotype, *C. tenebrosus* Walker, 1860, p. 300 (New Guinea), belong in the Sapromyzidæ. Attention has recently been called to this by Malloch, 1939, Ann. & Mag. Nat. Hist. (11) iii. pp. 447–449.

Chlorops postmacula Walker, 1849, List of . . . Dipterous Insects, etc., iv. p. 1121 (Sandwich Islands, now Hawaii), is also a Sapromyzid.

Chlorops conclusata Walker, 1865, Proc. Linn. Soc. viii. p. 128 (New Guinea). One specimen, bearing an old handwritten label, "*conclusata*," is probably Walker's type, although not labelled as such in the British Museum collection. It is definitely not a Chloropid, and may possibly be a Clusiid.

African *Chlorops* : along with these notes on *Chlorops* described by Walker it may be noted from the types that neither *Chlorops perpusilla* Walker, 1849, List, iv. p. 1121 (Sierra Leone), nor *Chlorops maculata* Walker, 1849, List, iv. p. 1122 (Sierra Leone), are Chloropidæ.

THRESSA Walker, 1860, Journ. Linn. Soc. (Zool.) iv. p. 146.

=*Chalcidomyia* Meijere, 1910. New synonym.
=*Hemisphærisoma* Becker, 1911. New synonym.

Thressa signifera Walker, 1860, p. 146 (Makessar, Celebes), genotype of *Thressa* Walker, was found to be a peculiar Chloropid with loosely pectinate antennæ, and not a Drosophilid as Walker originally described it.

The same concept had later been described by both de Meijere (in Drosophilidæ) and Becker (in Chloropidæ), and their names must fall as synonyms of the older name.

Walker's species is very close to *Chalcidomyia punctifera* Meijere, with a similar head, triangle, abdomen, and wing-venation. It is characterized by having a brown band along the entire costal margin of the wing, including all of the costal and marginal cells, widening out to include a broad apical portion of the submarginal cell and extending into the first posterior cell almost halfway to the fourth longitudinal vein. As in the other species, the discal cell is long and narrow, the fore cross-vein entering it at the proximal third of the cell.

EUTROPHA Loew, 1866, Ztschr. f. Ent. Breslau, xx. p. 26.

= *Pseudoformosina* Malloch, 1938, Proc. Linn. Soc. N.S. Wales, lxiii. p. 355. Monobasic; type, *Pseudoformosina nicobarensis* (Schiner) (*Chlorops*). New synonym.

In a recent paper on Australian Diptera Malloch erected a new genus for the reception of *Chlorops nicobarensis* Schiner. After a comparison of this species with Palæarctic material of the genotype of *Eutropha*, *E. fulvifrons* Haliday, the writer is convinced that the two are congeneric and that *Pseudoformosina* falls as a synonym. There is a slight difference in the length of the third antennal segment, and the distinctly browned wings are peculiar, but the short naked arista, short white body-hairs, slightly flattened scutellum with approximated apical bristles, and distinct sensory area on the hind tibiæ will place the species as *Eutropha*.

Eutropha noctilux (Walker). New combination.

Oscinis noctilux Walker, 1859, Journ. Linn. Soc. (Zool.) iii. p. 126. (Aru Islands, Malay Arch.)
Chlorops nicobarensis Schiner, 1868, 'Novara' Reise, p. 244. (Nicobar Is.) New synonym.
Chlorops fuscipennis Thomson, 1868, Eugenies Resa, p. 603.
Chlorops nicobarensis Becker, 1911, Ann. Mus. Nat. Hung. ix. p. 63.
Oscinella noctilux Becker, 1911, ibid. ix. p. 148.
Assuania noctilux Frey, 1923, Notulæ Ent. iii. p. 80.
Eutropha nicobarensis Duda, 1934, Tijd. v. Ent. lxxvii. p. 143; Stylops, iv. p. 240.
Pseudoformosina nicobarensis Malloch, 1938, Proc. Linn. Soc. N.S. Wales, lxiii. p. 355.

From the type, *Oscinis noctilux* belongs in the subfamily Chloropinæ, as Frey had already discovered, and it cannot therefore be referred to *Oscinella* as did Becker. It is the widely distributed species long known as *Chlorops nicobarensis* Schiner, which name must now fall as a synonym of the older *noctilux* Walker. Frey, Duda, and Malloch have located the species under three different genera of the Chloropinæ, but it appears to the writer to be correctly placed in *Eutropha*, which was the view of Duda.

INDIAN SPECIES DESCRIBED BY BRUNETTI.

Through the courtesy of the Director of the Zoological Survey of India I received for study a series of specimens which had been studied and determined by Brunetti. In a number of cases descriptions of the species had never been published, and hence the names placed on the specimens by Brunetti are manuscript names without standing in nomenclature. For this reason they will not be mentioned here, although most if not all of the species would fall as synonyms of species named by Becker, de Meijere, or other workers. The following notes will clarify the status of some species actually published by Brunetti :—

Elachiptera brevicornis Brunetti, 1917, Records Indian Museum, xiii. p. 101 (Simla Hills, India), was found to equal *E. indistincta* (Becker), 1911, Monograph, p. 134. New synonym.

Oscinis obscuripes Brunetti, 1913, Records Indian Museum, viii. p. 190 (Assam and N.E. India), belongs in the genus *Lasiopleura*. New combination.

Pachylophus rufescens Meijere. Brunetti, 1913, *op. cit.* p. 188, determined specimens from the Abor Expedition as *P. rufescens* but with a question. I have seen a large series from Calcutta, the Simla Hills, Bengal, North-east Assam, and Upper Burma, including some of the specimens recorded by Brunetti, and his interpretation of it as a widely distributed species varying considerably in the intensity of colour appears to be correct.

PEMPHIGONOTUS Lamb.

Malloch (1931, Ann. & Mag. Nat. Hist. (10) vii. pp. 473–477) briefly reviewed the characteristics of the genus, and presented a key to three species, including the genotype (*P. mirabilis* Lamb) and two new species. He suggested that *Chlorops rubra* Meijere might belong in the group also. The genus appears to be a valid segregate from *Chlorops*, though the genotypic species represents one extreme in wing-venation. The sensory area on the hind tibiæ, poorly defined triangle, fine hairs on the mesopleura and scutellum, and short, weak, approximated apical scutellar bristles distinguish the group from others in the Chloropinæ. The last character was not mentioned by Malloch, but occurs in all species known to me. The wing-venation is also unique, with very long first section of the costa and long discal cell, anterior cross-vein at the outer $\frac{2}{3}$ or $\frac{3}{4}$ of the discal cell, and the posterior cross-vein quite near the margin of the wing. The wings are heavily marked with brown.

From my studies of the types of Chloropidæ described by de Meijere, in the Zoologisch Museum at Amsterdam, the following species were found to belong in *Pemphigonotus*, and must henceforth be referred there in new combination :—

Chlorops rubra Meijere, 1910, Tijd. Ent. liii. p. 148. (Java.)

Chlorops paludosa Meijere, 1910, ibid. p. 148. (Java.)

Chlorops de-beauforti Meijere, 1913, Bijdr. tot de Dierk. 1913, p. 64. (Ceram.)

Chlorops kambangensis Meijere, 1913, Tijd. Ent. lvi. p. 288. (Java.)

Chlorops ochrostoma Becker, 1911, Ann. Mus. Nat. Hung. ix. p. 69. (New Guinea.) From the description it is practically certain that *ochrostoma* is also a true *Pemphigonotus*. Specimens from Sinabang, Simalur, identified as that species by de Meijere (1916, Tijd. Ent. lviii. Suppl. p. 53), belong in the group.

It may be noted here that Dr. O. Duda, 1934, in "Fauna Sumatrensis" (Tijd. v. Ent. lxxvii. pp. 133, 139), referred *rubra* to *Eutropha*, *de-beauforti* to *Chlorops*, *paludosa* and *kambangensis* to "*Chlorops* ?," *and ochrostoma* to his new genus *Coniochlorops*. The designated genotype of the latter, *Chlorops incisa* Meijere, is peculiar, and the genus is probably valid. Certainly none of the above species belong there.

Tentative Key to Pemphigonotus.

(This key is necessarily tentative because of the small number of available specimens. Sexual dimorphism and colour variation may later be found to eliminate some of the names.)

1. Antennæ entirely yellow .... 2.
Third antennal segment entirely black, the basal segments yellow .... 3.
Antennæ entirely black .... 4.

2. Large species (5 mm.); wings heavily browned; discal cell very long, the outer cross-vein diagonal, less than its length from the margin of the wing, and two or three times as long as the anterior cross-vein. (Melville Is., N. Australia.) .... *mirabilis* Lamb.
Smaller species (3 mm.); wing not as above, the outer cross-vein not strongly diagonal and not as close to the wing margin. (New Guinea.) .... *ochrostoma* Becker.

3. Anterior cross-vein at the outer 4/5 of the discal cell, only a little more than its own length from the hind cross-vein; anterior cross-vein distad the level of the junction of first vein with costa .... *rubra* Meijere (Java) [and *approximatus* Malloch (Phil. Is.).

(I cannot separate these species on the basis of Malloch's description. His careful notes of the colour pattern and venation in the wing of *approximatus* apply exactly to the type of *rubra*. In the latter the second and third sections of costa are subequal; in *approximatus* the second sector is said to be one and one half times the third. That distinction, if consistent, might serve to separate the species. *rubra* is also a darker, reddish colour, whereas Malloch's species was stated to be "orange or fulvous-yellow.")

Anterior cross-vein at the outer two-thirds of the discal cell and three or four times its length from the hind cross-vein; anterior cross-vein is proximad the level of the junction of first vein with costa. (Java.) .. *paludosa* Meijere.

4. Reddish brown to dark brown species, generally darker than any of the preceding .... *de-beauforti* Meijere [(Java), *kambangensis* Meijere (Java), [and *brunneus* Malloch (Phil. Is.).

(*brunneus* is placed here with some doubt: the antennæ are described as "almost fuscous".)

(More material is needed before anyone can reasonably suggest either synonymy or validity for any of these three species. Characteristics which seemed possible criteria, from notes on the types, admit of too much variability to be judged reliable on the basis of small numbers of specimens. For example, the type of *de-beauforti* has blackish femora, fore tibiæ, and tarsi; the type of *kambangensis* has dark reddish femora and hind tibiæ; and *brunneus* was said to have yellowish-brown legs, with the bases of all femora darker. *P. kambangensis* is a larger species (4½ mm.) than the others, but the type is apparently a female and may be normally larger. The type of *de-beauforti* is only 2½ mm. long, but may be a small male. *P. brunneus*, 3 mm. long, is intermediate.)

THE GENUS *RHODESIELLA* ADAMS.

It is unfortunate, though quite understandable, that one of the largest and commonest of the East Indian and African genera of Chloropidæ should have been referred to under several different generic names at various periods.

The species were known for many years under *Meroscinis* Meijere (1908), erected for *M. scutellata* Meij. from Java. Bezzi (1919, Journ. N.Y. Ent. Soc. xxvii. pp. 174–179) called attention to the fact that *Rhodesiella* Adams (1905), erected for an African "Agromyzid," was really the same Chloropid genus. He therefore replaced *Meroscinis* by *Rhodesiella*. Lamb (1917) had apparently noted the same thing, judging from a veiled hint in a footnote, but he continued to use *Meroscinis*. Becker (1924) and Duda (1930) also continued to use *Meroscinis*, though Frey (1923) adopted *Rhodesiella* for his treatment of the Philippine Chloropidæ.

In 1931 both Duda (June, 1931, Folia Zool. Hydrobiol. iii. p. 165) and Malloch (July, 1931, Ann. & Mag. Nat. Hist. (10) viii. pp. 49–69) stated that the species of *Meroscinis-Rhodesiella* must be called *Macrostyla* Lioy (1864), since they were congeneric with *Chlorops plumiger* Meigen, the genotype of Lioy's genus. Under the name *Macrostyla*, as the oldest available name, Malloch (1931, *op. cit.*) reviewed both African and Oriental species.

In the closing section on Chloropidæ in Lindner's 'Die Fliegen der Palæarktischen Region,' however, Duda (1933, Lfg. 72, p. 224) published the discovery that *Macrostyla* Lioy, 1864, was preoccupied by *Macrostyla* Winnertz, 1846. He proposed *Aspistyla* as a new name, with *Rhodesiella* and *Meroscinis* as synonyms. The use of *Aspistyla* was further established in his subsequent (1934) papers on Oriental Chloropidæ and on Chloropidæ in the 'Fauna Sumatrensis.'

It is generally accepted that the concepts represented by these names are the same, and that *Macrostyla* Lioy, the oldest proposed name, is a homonym and therefore unavailable. The writer fails to see the necessity of the erection of another generic name to replace it, however, when properly proposed names were already available in the synonymy. The next oldest available name becomes valid (Article 36 of the Rules). Following Bezzi (1919), therefore, I have adopted the use of *Rhodesiella* Adams (1905) as the next available name.

RHODESIELLA Adams, 1905.

=*Macrostyla* Lioy, 1864, preoccupied.
=*Merosoinis* Meijere, 1908.
=*Aspistyla* Duda, 1933 (n. n. for *Macrostyla* Lioy, not Winnertz, 1846).

Keys to the Oriental species are available in Becker's monograph (1911, Ann. Mus. Nat. Hung. ix. pp. 88–89), Malloch (1931, *op. cit.*), and Duda's work on the "Fauna Sumatrensis" (1934, Tijd. Ent. lxxvii. Suppl. pp. 86–90). Malloch's key is the most complete, as well as introducing some excellent specific characters. Unfortunately its usefulness is greatly impaired by the fact that the older types were unknown to its author and the older descriptions were too indefinite on the finer points upon which he based the separation of many species. As a result fourteen older species were included in the key from descriptions only. Malloch described eight new Oriental species in the paper, but at the same time missed five already described species. The same difficulty applies to the African *Rhodesiella*, in which he described three new species but omitted eight already described species.

It is the writer's hope and intention to present a complete key to the group as soon as sufficient material from a wide area has been studied. In the meantime Malloch's key will serve quite well for many species. The following notes will clarify this in a few places :—

Oriental species not included by Malloch: *planiscutellata* Lamb, 1918; *nobile* Frey, 1923 (*Euthyridium* Frey may not belong here); *orthoneura* Bezzi, 1928; *nana* Duda, 1930; and *sauteri* Duda, 1930 (last two probably published too late to be included by Malloch).

Oriental species described since Malloch's paper: *pallipes* Duda, 1934, and *flavitibia* Duda, 1934.

Rhodesiella scutellata (Meij.).—I agree with Malloch in limiting *scutellata* to the Oriental Region and distinguishing it from *tarsalis* Adams; *scutellata* also shows the same sexual dimorphism which Malloch noted for *femoralis* Mall. and other species. Widely distributed: I have seen specimens from Chipun and Tainan, Formosa; Calcutta, India; Singapore, Pahang, and Selangor in the Federated Malay States; and Kudat, North Borneo; besides the type from Semarang, Java.

Rhodesiella elegantula (Beck.).—The species will not run in Malloch's but will run fairly well in Duda's (1934) key. *R. quadriseta* (Meij.) does not appear to be a synonym, as Duda suggested.

Rhodesiella affinis (Malloch) is undoubtedly a synonym of *quadriseta* Meij., since the type of the latter runs directly to *affinis* Mall. in Malloch's key and agrees with the description. I have seen *quadriseta* from Calcutta, India, and Serdang, Malaya, besides the type from Semarang, Java.

Rhodesiella nigrovenosa (Meijere), which Malloch could not place in his key from the original description, will run to couplet 8 under the *tarsalis* group, and is near *hirtimana* Mall.

meijerei Becker is not a *Rhodesiella*! Duda (1934) placed it in *Elachiptera* Macq., which, if not the correct position, is at least much more reasonable, on the basis of the scutellum and wings, than in *Rhodesiella*.

MISCELLANEOUS NOTES.

Oscinis theæ Bigot, frequently recorded as a leaf miner in tea-leaves, appears not to be a Chloropid. Specimens bred from tea by Mr. C. B. Redman King, of the Tea Research Institute at Talawakelle, Ceylon, and supposed to be *O. theæ*, proved to be an *Agromyza* species. Bigot's type is unknown to me, but it is probably this species, since it was reared from tea.

Coomanimyia Séguy, 1938, Encyc. Ent. ix. p. 102; genotype, *C. ops* Séguy, 1938, p. 102 (Tonkin).—The species is closely related in the form of head, antennæ and scutellum, colour-pattern, and wing-venation, to *Formosina gigas* Becker and *F. lucens* (Meijere), and I believe that it should be referred to that genus. *Coomanimyia* becomes a synonym of *Formosina* Becker. (New synonym.)

Oscinella pænultima Becker (1911, Monograph, p. 163).—I agree with Duda that *pænultima* Beck. and *inæqualis* Beck. (1911, p. 164) are the same species. Duda used the latter name, but *pænultima* has page preference. I have seen specimens from Kuala Lumpur and Kedah Peak, Malaya (Imper. Inst. and Selangor Museum), besides the type-series of *pænultima*.

Cestoplectus intuens Lamb (1918, Ann. & Mag. Nat. Hist. (9) i. p. 392).—I have seen specimens from Serdang and Kuala Lumpur, Malaya (Imper. Inst.), in addition to the type-series from Ceylon. The small amount of material indicates that the character of the black third antennal segment applies only to females. The one male received (Serdang, Malaya) has entirely yellow antennæ, indicating a probable sexual dimorphism.

XLIV.—*Mallophagan Miscellany.*—Part I.

By THERESA CLAY, B.Sc.

The Leiden Piaget Collection.

IN the spring of 1939 the author was able to visit Leiden and examine the Piaget Collection in the Rijksmuseum van Natuurlijke Historie, and was there given much valuable assistance by Dr. Blöte and Dr. Junge. In the ornithology department were seen the original specimens of birds from which Piaget took so much of his material described in the "Pediculines." These are all mounted specimens, and were apparently in this condition when Piaget searched them for Mallophaga.

Below are given a few notes on certain species belonging to groups already studied by the author, but it must be remembered that the specimens are in poor condition and need remounting before it is possible to be certain about the sex and absolute identifications in all cases. In passing it may be noted that the lists given by G. Thompson (Ann. & Mag. Nat. Hist. vol. xx. p. 19, 1937, *et seq.*) were apparently compiled from the labels on the slides, the specimens not having been examined. Since Piaget's slides frequently hold more than one species, and since the name on the label often does not apply to the actual specimen, these lists only give the roughest idea as to what is in the Piaget Collections in the British and Leiden Museums. Also it does not follow that because there is no slide labelled with a given species that the species is not in the collection, as is stated by

Thompson (Ann. & Mag. Nat. Hist. vol. iv. no. 22, p. 471, 1939) *, since it may appear on a slide labelled with another specific name; examples of types present in the British Museum but not listed by Thompson are *Goniodes ocrea* and *Lipeurus maculipes.*

Notes are given on the Piaget species described from the Tinamidæ and the *Lipeurus* species from Gallinaceous hosts, and since in two papers † by the present author on these subjects no lectotypes were designated, this has now been done.

Species from Tinamidæ *in Piaget Collection at Leiden.*

1. *Goniodes subdilatus.* Slide no 220. 2 ♀♀. Host:—*Tinamus variegatus.*

These are *Heptapsogaster* apparently conspecific with specimens in the Piaget Collection in the British Museum as redescribed by Clay (P. Z. S. ser. B, p. 139, 1937).

2. *Goniodes subdilatus.* Slide no. 221. 1 ♀. Host:—*Tinamus canus.*

This specimen is quite distinct from those on the slide no. 220, and should probably be placed in Carriker's *Heptarthrogaster.* The host of this specimen is the same as the type-host of *G. excavatus*, and it is possible that this is the specimen figured in pl. xxiii. fig. 4*a* (1880) as the female of *G. excavatus.* There are, however, certain differences between the figure and the specimen, namely, that the latter has the anterior margin of the head more rounded and has no concavity in the lateral margin. These differences may be due either to inaccuracies or to the fact that this is not the specimen from which the figure was drawn.

Designation of Lectotypes of the Piaget Species from Tinamidæ.

Goniodes aculeatus. Lectotype: ♀ in B.M.‡, slide no. 548.

Goniodes complanatus. Lectotype: ♀ in B.M., slide no. 559. Paratype: 1 imm. 1 ♀, 2 imm. labelled *complanatus* in B.M. collection are *Austrokelloggia* sp.?

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* This also applies to the list of the Denny species published by Thompson.

† P. Z. S. ser. B, 1937, p. 133, and P. Z. S. ser. B, pt. 2, 1938, p. 109.

‡ B.M. stands for British Museum (Natural History) and L.M. for Leiden Museum.

Goniodes excavatus. Lectotype : ♂ in B.M., slide no. 558. Paratype : 1 ♂.

Goniodes laticeps. Lectotype : ♂ in B.M., slide no. 549.

Goniodes setosus. Lectotype : ♀ in B.M., slide no. 550.

Goniodes sexpunctatus. Lectotype : ♂ in B.M., slide no. 551. Paratypes : 1 ♂, 3 ♀♀.

There is also 1 ♂ of this species labelled *G. dilatatus* from *Tinamus variegatus.*

Goniodes spinosus. Lectotype : ♂ in B.M., slide no. 556.

Goniodes subdilatatus. Lectotype : ♂ in B.M., slide no. 566. Paratypes : 4 ♂♂, 7 ♀♀.

There are also 1 ♂, 2 ♀♀ and 1 ♂, 1 ♀ of *G. subdilatatus* in B.M. and L.M. labelled *G. dilatatus* from *Tinamus variegatus* and *Tetrao cupido* respectively.

Goniocotes alatofasciatus. Lectotype : ♂ in B.M., slide no. 554. Paratypes : 2 ♀♀. These specimens are labelled *Gc. sexsetosus.*

There is also 1 ♂, 1 ♀ of this species labelled *G. dilatatus* from *Tinamus variegatus.*

Goniocotes sexsetosus. Lectotype : ♀ in B.M., slide no. 553. This specimen is labelled *Gc. alatofasciatus.* Another slide labelled *Gc. sexsetosus* holds 1 ♀ *alatofasciatus* and 1 ♀ *Rhynchothura* sp. ?

Lipeurus longipes. Lectotype : ♂ in B.M., slide no. 570.

Menopon arctifasciatum. Lectotype : ♂ in B.M., slide no. 574. Paratypes : 1 ♂, 6 ♀♀.

Lipeurus *Species from Gallinaceous Hosts in the Piaget Collection at Leiden.*

1. *Lipeurus intermedius.* Slide no. 158. 2 ♀♀. Host :—*Euplocomus ignitus* (=*Lophura ignita*).

   These specimens are *Oxylipeurus piageti* Clay, 1938.

2. *Lipeurus longus.* Slide no. 159. 1 ♀, 1 imm. Host :—*Tragopan satyra.*

   These specimens are *Oxylipeurus longus* (P.).

3. *Lipeurus inæqualis.* Slide no. 160. 1 ♂, 2 ♀♀. Host :—*Megapodium rubripes* v. *forsteni* (=*M. reinwardti forstenii* Gray).

   1 ♀ is *Oxylipeurus inæqualis* (P.), 1 ♂, 1 ♀ are *Lipeurus latifasciatus* P.

4. *Lipeurus appendiculatus.* Slide no. 161. 1 ♂, 1 ♀. Host :—*Megapodium rubripes* v. *gilberti* (=*M. nicobariensis gilbertii* Gray).
These specimens are *O. appendiculatus* (P.).

5. *Lipeurus unicolor.* Slide no. 164. 1 ♂, 2 ♀♀. Host :—*Perdix javanica* (=*Arborophila javanica*).
These specimens are *Oxylipeurus unicolor* (P.).

Designation of Lectotypes of the Piaget Species of Lipeurus *from Galliformes.*

Lipeurus acuminatus. Lectotype : ♀ in B.M., slide no. 245. Paratypes : 1 ♀, 1 imm.

Lipeurus antennatus. Lectotype : ♂ in B.M., slide no. 258. Paratype : 1 ♀, 1 imm.

Lipeurus appendiculatus. Lectotype : ♂ in B.M., slide no. 256. Paratypes : 2 ♂♂, 2 ♀♀ in B.M. and L.M.

Lipeurus appendiculatus v. *major.* Lectotype : in B.M., slide no. 319.

Lipeurus castaneus. Lectotype : ♂ in B.M., slide no 242. Paratypes : 1 ♂, 2 ♀♀.

Lipeurus differens. Lectotype : ♂ in B.M., slide no 248. Paratypes : 1 ♂, ? 3 ♀♀ *.

Lipeurus docophoroides. Lectotype : ♂ in B.M., slide no. 246. Paratypes : 1 ♂, 2 ♀♀.

Lipeurus hamatus. Lectotype : ♀ in B.M., slide no 230.

Lipeurus maculipes †. Lectotype : ♀ in B.M., slide no. 244. Paratypes : 2 ♀♀.

Lipeurus heterographus var. *major.* Lectotype : ♀ in B.M., slide no. 241. Paratypes : 2 ♀♀.

Lipeurus inæqualis. Lectotype : ♂ in B.M., slide no. 240. Paratypes : 2 ♀♀ in B.M. and L.M.

Lipeurus intermedius. Lectotype : ♂ in B.M., slide no.227.

Lipeurus latifasciatus. Lectotype : ♂ in B.M., slide no. 235. Paratypes : 2 ♀♀.
There are also 1 ♂, 2 ♀♀ of this species labelled *L. inæqualis* var.

Lipeurus longus. Lectotype : ♀ in B.M., slide no 237. Paratypes : 2 ♂♂, 1 ♀, 5 imm. in the B.M. and L.M.

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* See Clay, P. Z. S. ser. B, 1938, p. 129.

† *Ibid.* p. 149.

Lipeurus megalops. Lectotype : ♀ in B.M., slide no 234. Paratype : 1 ♀.

Nirmus nigromarginatus. Lectotype : ♀ in B.M., slide no. 257. Paratype : 1 ♀.

Lipeurus parumsetosus. Lectotype : ♀ in B.M., slide no. 424.

Lipeurus rubrifasciatus. Lectotype : ♂ in B.M., slide no. 250. Paratypes : 1 ♂, 3 ♀♀.

There are also 1 ♂, 5 ♀♀ *Columbicola* sp. ? labelled *L. rubrifasciatus* from *Tinamus solitarius.*

Lipeurus tsade. Lectotype : ♂ in B.M., slide no. 229. Paratypes : 1 ♂, 1 ♀.

Lipeurus uncinatus. Lectotype : ♂ in B.M., slide no. 231. Paratypes : 1 ♂, 4 ♀♀.

Lipeurus unicolor. Lectotype : ♂ in B.M., slide no. 252. Paratypes : 4 ♂♂, 5 ♀♀ in B.M. and L.M.

Further Notes on Lipeurus *Species from Gallinaceous Birds.*

In the author's paper on *Lipeurus* (P. Z. S. ser. B, 1938, p. 109) *L. parumsetosus* Piaget was omitted. This species is represented in the collection by a single ♀ from *Rhynchæa lævigata* (=? *R. variegata*=*Rostratula benghalensis*), which is presumably not the correct host, as it is a typical *Lipeurus.* As there appears to be no difference between this specimen and those of *L. uncinatus* Piaget, *parumsetosus* and *uncinatus* must be regarded as synonyms, and although *parumsetosus* has page priority it is possible, according to a recommendation to the International Rules, to ignore this if there are adequate reasons. Since *parumsetosus* is represented by a single ♀ straggler, it seems more satisfactory to place the name as a synonym of *uncinatus*, the latter being represented by 2 ♂♂ and 4 ♀♀ from the true host.

Nirmus tessellatus Denny from *Botaurus stellaris* should be included in the genus *Lipeurus.* It is represented in the Denny collection by an immature specimen the identification of which is uncertain, but is possibly *L. caponis* (L.). The name should either be discarded or placed as a synonym of *caponis.*

The Host of three of Piaget's Species.

There are four species of Piaget's with the host-label "Xulla Mangola." This name proves to be one of the Sula Islands, more usually written Sula Mangola, and it is difficult to imagine what prompted Piaget to make Xulla a subgenus of *Larus*. Since all but one of the species appeared to come from a Corvine host, a point was made while in Leiden to examine the specimens of Corvidæ which were in the museum in Piaget's time. Two specimens of *Corvus enca celebensis* were found, on the stands of which were written "Xulla Mangola," the actual name of the species having been written in subsequently, and these are almost certainly the actual specimens from which Piaget obtained his types. These two crows were examined for Mallophaga, and specimens of *Myrsidea, Liotheum*, and *Philopterus* were found. In the Piaget Collection in the British Museum there are 3 ♂♂, 2 ♀♀, and 2 immatures of *Myrsidea grandiceps* (P.) and 1 ♀ of *Liotheum ellipticum* (P.) which appear to be conspecific with the specimens obtained from *Corvus enca celebensis*; this host therefore should be considered as the type-host of these species.

Also in the Piaget Collection are two specimens labelled *Nirmus latifasciatus*, both ♀ Corvine *Bruelia*; one specimen has the host-label "Xulla Mangola," and is presumably from the host mentioned above, but this will have to be confirmed. The other specimen, which is not conspecific with the first, has the host-label "*Larus crassicornis*," and must either have straggled from one of the Corvidæ or the slide is incorrectly labelled—a common occurrence in the Piaget Collection.

The fourth species with the host-label "Xulla Mangola," *Philopterus dubius*, is represented in the collection by a single ♀. This specimen is not a true Corvine *Philopterus*, and no indication as to the correct host can be given.

The Host of Craspedorhynchus insolitus *Kéler.*

In Arb. morph. taxon. Ent. Berlin-Dahlem, v. 1938, p. 240, Kéler described *Craspedorhyncus insolitus* as a new species obtained from a hawk from Ekona, Cameroons. In the collection of Colonel Meinertzhagen there are

2 ♂♂, 1 ♀ paratypes of *C. insolitus*, received through the kindness of the late Dr. Horn of Berlin-Dahlem. These have been compared with specimens of *Craspedorhynchus* from all Accipitrines which are likely to occur in the Cameroons, and appear to be conspecific with specimens from *Aquila wahlbergi* Sund., which occurs commonly in that region.

XLV.—*Notes on Bermudan Nemerteans*: Gorgonorhynchus bermudensis, *sp. n.* By J. F. G. WHEELER, D.Sc.*

THE discovery of a species of *Gorgonorhynchus* at Bermuda apparently similar in the structure of the proboscis to that described by Dakin and Fordham from New South Wales (1931) was reported in 'Nature' in 1936 shortly before the publication of a full description of the Australian species (1936). I have now examined many Bermuda specimens, and conclude that, except in size, shape, and colour, no constant differences can be recognized. Bearing in mind the uniformity of heteronemertean anatomy this is not surprising. The following notes are based on twenty-seven specimens captured at various localities in February, April, June, July, August, and September from 1932 onwards. Four series of sections, three of them complete series of the head, form the basis of the anatomical notes.

Gorgonorhynchus bermudensis is bright light red in colour, deeper anteriorly and pale over the flattened tail. The colour is considerably yellower than that shown in Dakin and Fordham's sketches (pl. i.), and the underside of the body is invariably pale. The brain is always evident as a bilobed reddish mark showing through the dorsal or ventral surface, and as a flash of more brilliant red in the cephalic slits when the head is turned to the side. The body is soft. At the head end it is rounded in section. It becomes flattened towards the middle and very flat at the tail, where the edges are sharp and give the appearance of longitudinal fins. The head is pointed and the tip round. The cephalic slits are long and the mouth small. The tail is pointed and carries a fine colourless caudal appendage 1–2 mm. long. Gonads were visible in specimens taken in August as whitish dots. The sizes of a number of living animals are tabulated below :—

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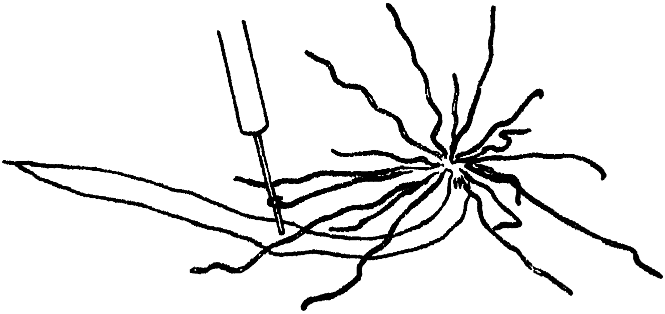
* Contribution from the Bermuda Biological Station for Research, Inc.

Date.	Locality.	Length in cm.	Greatest breadth in mm.
1. iv. 32	Soldier Bay, St. Georges.	3·0	1·3
6. vi. 33	" " "	12·0	2·0
4. viii. 35 ..	Richardson's Cove, St. Georges.	6·5	2·0
21. viii. 35 ..	" " "	3·0	1·5
12. iv. 38	" " "	5·0	2·0
25. vii. 39	Bailey's Bay.	5·0	1·7
	" "	6·0	2·0
11. ii. 40	Richardson's Cove, St. Georges.	5·0	1·0
	" " "	5·0	1·0

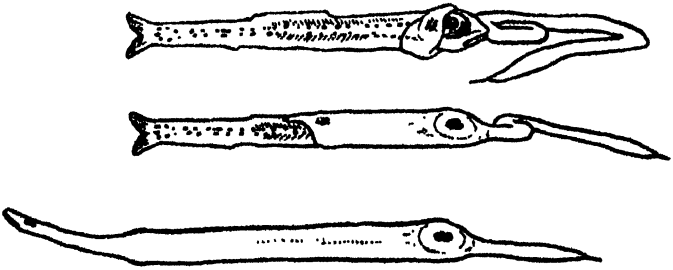
The animals move easily and rapidly. The reactions to the touch of a blunt needle are initially a withdrawal of the head and bunching up of the body, followed on further stimulus by waves of muscular activity which result either in swimming or by protrusion of the proboscis. The swimming action is vigorous; the undulatory motion of the tail is up and down, but the worm may turn on its side, when it looks like a small sand-eel. If protrusion of the proboscis takes place it cannot be better or more accurately described than by Dakin and Fordham's word "explosive"; but it does not appear to be directed particularly at the point of attack. My impression of the act is sketched in fig. 1. The head is certainly lifted and turned, but the proboscis branches shoot out in all directions, suggesting an attempt to intimidate the aggressor rather than an active defence measure. Sometimes the proboscis is completely thrown out, but I am by no means sure that this happens under natural conditions. It is the usual reaction to rough handling out of water or the application of fixing agents before narcotization. The worms are mainly nocturnal; those in captivity can always be found moving at night, but they are not particularly sluggish during the day. Having recently read S. Kanda's report on luminescence in *Emplectonema kandai*, I tested a specimen mechanically and chemically, but obtained no positive response.

Fig. 1.



Gorgonorhynchus bermudensis. Eversion of proboscis on stimulation.

Fig. 2.



Gorgonorhynchus bermudensis engulfing a small fish.

Gorgonorhynchus is the second commonest nemertean found in Bermuda. At a rough estimate one stone in twenty just below or above low-tide mark in at least three localities conceals a specimen. I have not known captive worms to attack a living animal, but they eat small pieces of dead fish. Fig. 2 shows successive phases of the ingestion of a freshly killed young blue fry (*Atherina* *harringtonensis*). The worm enveloped it smoothly and moved on somewhat rigidly, but with no change of pace. The process took about a minute.

The internal anatomy is typically heteronemertean; in fact, as stressed by Dakin and Fordham, *Gorgonorhynchus* differs only in the form of the proboscis from a member of the Lineidæ, and in this respect it differs from all known nemerteans. The proboscis of *G. bermudensis* is rarely, if ever, fully developed with the maximum number of sixty-four branches. The first specimen I collected "extruded ten to twelve thin white threads in place of the single normal proboscis of the Phylum," and other specimens I have since examined have apparently not had many more. The diagram in fig. 3 has been made from a series of sections of a nearly ripe female. The regularity of the bifurcations up to the sixteen-branch stage is very noticeable, and they follow one another closely. In this animal three of the branches did not divide again (fifth bifurcation) and only four branches of the sixth order divided into the ultimate twigs. The fifth bifurcation of the upper fourth-stage branches in the bottom right-hand corner of the diagram occurred in the sections long after all the other divisions had been noted, and the one previous to this was the fifth bifurcation shown above it, so that unless the proboscis is fully everted the ultimate branches do not appear. Dakin and Fordham suggest that the absence of a retractor muscle makes it almost inevitable that the proboscis is completely everted, but since the process must depend on muscular pressure applied to the rhynchocœlomic fluid complete eversion does not necessarily follow unless maximum pressure is applied.

The anatomy of *G. bermudensis* is similar to that of *G. repens* even in finer points such as the appearance of muscle-crosses in the proboscis branches after the fourth bifurcation. I find only one pair of efferent excretory ducts in each of two series of sections. The brain and nervous system is similar, but I take exception to the statement that "In some Nemerteans the dorsal commissure passes above the rhynchodæum, but in *Gorgonorhynchus* the whole brain lies behind the origin of the proboscis " (p. 475). In two of my series of sections the brain and dorsal commissure are well in front of the origin of the proboscis; in the third they are just behind it; and in the fourth the proboscis originates after the dorsal commissure but before the larger part of the brain has appeared in the sections. Obviously this character depends on the state of differential contraction of the animal. A single pair of neurochord-cells is present among the nerve-cells of the median border of the ventral ganglia just posterior to the ventral commissure, and a feature of the lateral nerves that appears in all my sections is the presence of three sets of clear rounded spaces in the fibrous core which I take to be large nerve-fibres seen in section.

Fig. 3.

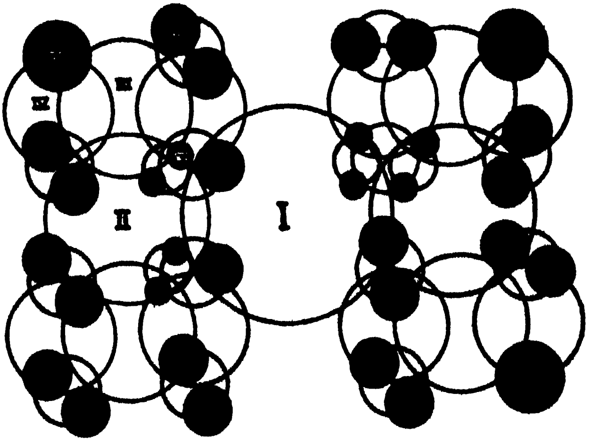


Diagram of successive bifurcations (open circles) of the proboscis leading to thirty-three ultimate twigs (filled circles), eight of the seventh order, twenty-two of the sixth, and three of the fifth.

Gorgonorhynchus bermudensis is typically heteronemertean in structure, and, except for the dichotomous branching of the proboscis, it is similar in anatomical and histological detail to worms of the genus *Cerebratulus*. It is separated from the type-species, *G. repens*, by the following characters :—The body varies in length up to 12·0 cm. and is 2·0 mm. wide at the widest part. In colour it is bright yellowish or brownish red, fading at the edges of the back and down the body. The underside is colourless. The posterior end of the body is flattened and forms a swimming-fin ; and the caudal appendage is colourless and 1–2 mm. long. It is common under stones at low-tide mark in the Bermudas.

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XLVI.—*On some Oligochæta from Palestine.* By Dr. L. CERNOSVITOV, British Museum (Natural History).

RECENTLY I had an opportunity (1938) of giving a list of all Oligochæta hitherto recorded from Palestine and making a very brief zoogeographical analysis of the Oligochæte fauna. The new material from the Department of Zoology, The Hebrew University, Jerusalem, for which I am greatly indebted to Dr. K. Reich, does not bring much new from the zoogeographical aspect, but has great faunistic and systematic value. First we have to note the presence of three representatives of the family Enchytræidæ. Only unnamed, immature specimens have previously been recorded by Stephenson (1913) from the neighbourhood of Lake Tiberias. These three species have a wide distribution in Europe, and have also been recorded many times from Africa. *Microscolex phosphoreus* is also recorded for the first time from Palestine, but is widely spread in the Mediterranean zone. The interest of the occurrence of *Ocnerodrilus occidentalis* in the material examined is decreased by the fact that it was found in roots of *Litchia sinensis* brought from South Africa. We can, however, regard this species as established in Palestine, as it has been found on two occasions, once in May 1936 and then in January 1937. Among the Lumbricidæ we meet two new species, which increase the number of endemic species known from Palestine to seven.

The following species of Oligochæta were present in the material examined :—

Family **Enchytræidæ.**

Enchytræus buchholzi Vejd.

Jerusalem, "Feuchte Erde, Zucht." Great number of mature and immature specimens.

Species of Palæarctic origin, which has also been recorded from several localities in South America (Brazil, Argentine, S. Patagonia, Peru).

Fridericia perrieri (Vejd.).

Ramoth Hashavim, Coastal Plain, N. of Tel Aviv, 12. xii. 1936. One mature specimen.

Species of Palæarctic origin, which is also known from many localities in Africa (Natal, Kenya Colony).

Fridericia callosa (Eisen).

Rosh Pinah, Galilee, 4. iii. 1937. Five specimens.

Kfar Iwri, 7 km. N.E. of Jerusalem, 13. ii. 1938, "Humus aus Höhlen." Numerous specimens.

Species of Palæarctic origin, recorded also from South America (Argentine) and Costa Rica. For the second time it is found in caves. The first record was from a cave near the village Progled in the Rhodope Mountains in Bulgaria (Cernosvitov, 1937).

Family **Tubificidæ.**

Tubifex (*Psammoryctes*) *albicola* (Mich.).

Lake Huleh, 26. iii. 1933. One mature specimen.

This species has been previously recorded by the author (1938) from the same locality. It is also known from Germany, Denmark, Czechoslovakia, Bulgaria, and Russia.

Family **Megascolecidæ.**

Subfamily *Acanthodrilinæ.*

Microscolex phosphoreus (A. Dugès).

Jerusalem, Botanical Garden, ii. 1938. One specimen.

Rosh Pinah, Galilee, 4–8. iii. 1931. One specimen.

For the first time recorded from Palestine, but is widely distributed in the Mediterranean region.

Subfamily *Ocnerodrilinæ.*

Ocnerodrilus (*Ocnerodrilus*) *occidentalis* Eisen.

Daganiah "A," between Lake Tiberias and Jordan outflow, E. bank, 23. v. 1936. "In Wurzeln von *Litchia sinensis*, aus S. Afrika." Six specimens.

Same locality, 20. i. 1937. "Gemuse Garten." One specimen.

This species is widely distributed in the tropical and subtropical region. It has been recorded from California, Mexico, St. Thomas, Cape Verde Is., Comoro Is., Rhodesia, Ceylon, India, and ? China, but is found for the first time in Palestine or the Mediterranean zone.

Family **Criodrilidæ.**

Criodrilus lacuum Hoffm.

Lake Huleh, 26. iii. 1933. Two immature specimens apparently belonging to this species.

It has been previously recorded by the author (1938) from the same locality, and by Stephenson (1913) from Lake Tiberias. It is also known from Syria, India, and Europe.

Family **Lumbricidæ.**

Eiseniella tetrædra (Sav.) forma ?

Lake Huleh, 24. iii. 1933, and 1. ix. 1935. Ten mature specimens.

These immature specimens probably belong to *E. tetrædra* (Sav.) mut. *ninnii* (Rosa), which is recorded by the author (1938) as common in the same locality.

Eisenia rosea (Sav.) ? var.

Kfar Iwri, 7 km. N.E. of Jerusalem, 13. ii. 1938, " Humus aus Höhlen." One mature specimen.

This much macerated specimen undoubtedly belongs to *Eisenia rosea*, but has no spermathecæ. It thus resembles *E. rosea* var. *bimastoides* Cogn., also without spermathecæ, but with only two pairs of seminal vesicles. The advanced maceration of the specimen from Palestine did not permit a detailed investigation of the internal anatomy, but the presence of two pairs of large seminal vesicles in segments 11 and 12 and two pairs of small ones in segments 9 and 10 was evident. From the available material I cannot decide whether it is only an abnormal specimen or whether it belongs to a new variety. The last possibility seems to be very probable, especially as *E. rosea* var. *bimastoides* is widely distributed in the Mediterranean region. At the present time it is known from Sardinia, Liguria, and Bulgaria. A few years ago I had the opportunity of examining a large number of specimens from Egypt, sent to me by Mr. A. Khalaf ed-Deweini, Egyptian University, Zoological Department, Cairo.

The following is a short description of the specimen from Palestine:—Length of the body about 48 mm. Number of segments 66. Body unpigmented. Prostomium epilobous (½). The first dorsal pore in intersegmental furrow 6/7. Setæ paired, very narrow. Setæ *ab* of segment 16 on large glandular papillæ. Less prominent papillæ on segments 9 and 10 round the setæ *cd*. Male pores on small glandular porophores which do not extend over the limits of segment 15. Clitellum saddle-shaped, on segments 24–32. Tubercula pubertatis on segments 29–31. Four pairs of seminal vesicles in segments 9–12; two anterior pairs considerably smaller than the others. No spermathecæ.

Eophila atheca, sp. n. (Figs. 1 & 2.)

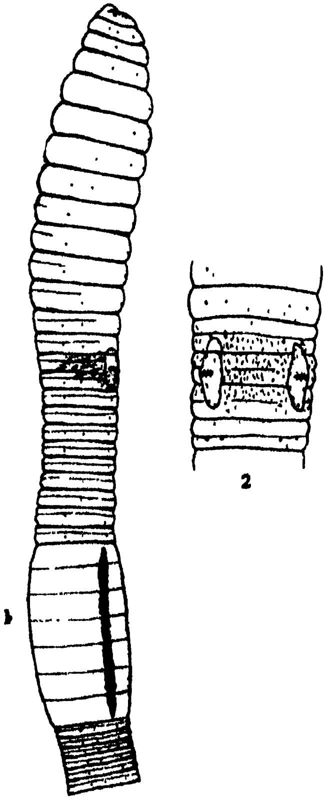
Jesud Hamaalah, by the Lake Huleh, 19. ii. 1936. One mature and two immature specimens.

Rosh Pinah, Galilee, 4–8. iii. 1937. One mature specimen.

Daganiah " A," between Lake Tiberias and Jordan outflow, E. bank. One mature specimen.

Karmel, near Haifa, 11. iii. 1938. One mature specimen.

Four mature specimens from different localities were examined. The largest one measured 245 mm., diameter of anterior end 7·5 mm., that of posterior end 6 mm. Number of segments 230. The other mature specimens measured 136, 117, and 100 mm., and had 181, 173, and 184 segments respectively. Body round, unpigmented, yellowish grey or brownish. Prostomium epilobous (1/3–1/4), closed behind. With the exception of clitellum



Eophila atheca, sp. n.

Fig. 1.—Anterior part of the body.
Fig. 2.—Male pores.

and anterior 9 or 10 segments all segments distinctly biannulated with smaller anterior ring.

Setæ small, widely paired. On segment 11 $aa=3ab=2cd=1\frac{1}{2}bc=\frac{1}{3}dd$; $u=2\frac{1}{2}\text{-}2\frac{1}{3}dd$; $ab=\frac{2}{3}cd=\frac{1}{2}bc$; or $aa:ab:bc:cd:dd=6:2:4:3:18$. Immediately behind the clitellum $ab=cd$; $aa=2\frac{1}{3}ab=1\frac{2}{5}bc$; or $aa:ab:bc:cd:dd=7:3:5:3:15$. In the posterior part of the body ab is also equal to cd, but $aa=3ab=2\frac{1}{2}bc$; $dd=2aa=\frac{2}{5}u$; or $aa:ab:bc:cd:dd:u=15:5:6:5:30:75$. There are no glandular papillæ and no setæ are transformed into genital setæ.

Dorsal pores from 4/5 or 5/6 intersegmental furrow. The first septum is developed between segments 5 and 6. The anterior septa 6/7 to 13/14 are strongly thickened, the 14/15 only slightly. The crop occupies segments 15 and 16; the gizzard occupies the space between anterior septum of segment 17 and posterior septum of segment 20 (=4), but its actual length corresponds to the length of 2½ segments. Last hearts in segment 11.

The male pores in form of long transverse slits situated on segment 15 between the setal lines *a* and *b*. The large flat porophores, elliptic in shape, extending over a half of segment 14, segment 15, and nearly the whole of segment 16 (figs. 1 & 2). In fully mature specimens the ventral surface of the body between the male pores is also glandular. The female pores on segment 14 at 2/3 of the distance between setæ *a* and *b*.

The clitellum is ring-shaped, equally developed on both ventral and dorsal side. In fully mature specimens the intersegmental grooves and dorsal pores are obliterated. In three specimens the clitellum occupied segments 26–32 (=7), in fourth segments 26–33 (=8). In all specimens preserved in alcohol a wide dark brown or sometimes blue-black stripe was present on each side extending along all clitellar segments, immediately above the line of setæ *b* in the place usually occupied by tubercula pubertatis. These two side-lines are not glandular or elevated above the surface of the clitellum, but on account of their position must be regarded as tubercula pubertatis (fig. 1).

Two pairs of free testes and seminal funnels in segments 10 and 11. Two pairs of large lobated seminal vesicles in segments 11 and 12. The female organs have their usual position; small ovisacs are present in segment 14. There are no spermathecæ.

The position of the clitellum brings *E. atheca* near to *E. augilensis* Sciacch. from North Africa (Oasi di Augila), but as I. Sciacchitano (1932) does not give the description of the internal anatomy of his species it can be doubted whether it really belongs to the genus *Eophila*. In *E. augilensis* the clitellum is saddle-shaped and tubercula pubertatis are developed on segments 30–32, which distinguishes it from *E. atheca.*

Dendrobæna orientalis, sp. n. (Figs. 3–5.)

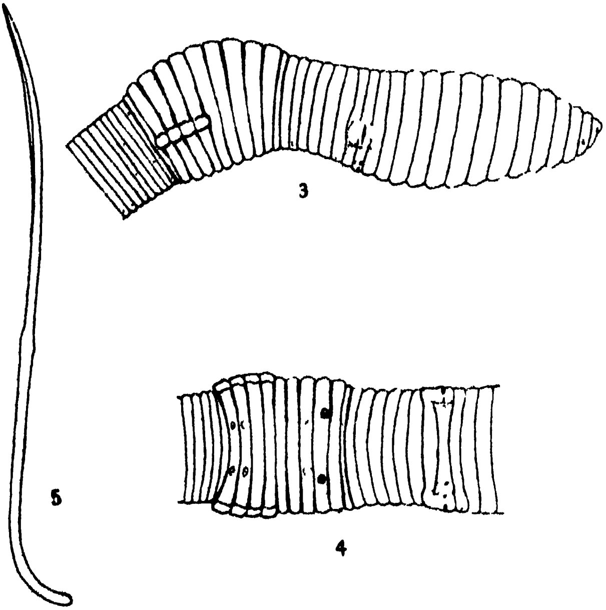
Rosh Pinah, Galilee, 4–8. iii. 1937. One fully mature and well preserved specimen.

Length of the body 45 mm., diameter of the anterior part about 4 mm., of the posterior part 3 mm. Number of segments 121. Body round, tapering to the posterior end, without terminal swelling. The segments narrow, especially the postclitellar, with distinct intersegmental grooves. A few segments in the region of genital organs (segments 8–14 approximately) with indistinct secondary grooves on dorsal side which divide the segments in two equal rings. Prostomium tanylobous. The anterior segments on the dorsal side dark pigmented, the ventral surface in the specimen preserved in alcohol yellowish. Clitellum unpigmented, of light colour.

The setæ are widely paired or rather separated. On all segments $dd > aa > bc > ab$; anteclitellar ab slightly bigger than cd, but in the postclitellar segments the distance between ab is approximately equal to cd. On segment 12 $aa = 1\frac{1}{2}ab$; $bc = 1\frac{1}{4}ab$; $dd = 3cd$, or $aa : ab : bc : cd : dd = 18 : 12 : 15 : 11 : 33$. On postclitellar segments $aa = 1\frac{3}{4}ab$; $bc = 1\frac{1}{4}ab$; $u = 4\frac{1}{3}dd$, or $aa : ab : bc : cd : dd = 7 : 4 : 5 : 4 : 9$.

The ventral surface of segments 11 to 16 is strongly glandular and round the setæ *a* is modified to form indistinct papillæ similar to those of segment 26. These papillæ are more prominent on segment 15 only. The setæ *b* on segments 11 and 16 are situated on better developed papillæ, distinguished by their light colour from the surrounding parts of segments. The setæ on glandular papillæ are modified as genital setæ. Those of segment 11 are 1·02 mm. long and 25 μ thick at the inner end, and gradually narrowing toward the slightly curved and pointed outer end (fig. 5). The external third of the setæ is deeply excavated on the concave side.

The first dorsal pore in the intersegmental groove 5/6. The septa in genital region are slightly thickened, the others are very thin. Six pairs of lateral hearts in segments 6 to 11. Calciferous glands in segments 11 and 12, better developed in the latter. The crop occupies the segments 15 and 16, gizzard in segments 17 to 19.



Dendrobæna orientalis, sp. n.

Fig. 3.—Anterior part of the body.
Fig. 4.—Clitellum from the ventral side.
Fig. 5.—Genital seta from segment 11 (*b*).

The male pores are situated on segment 15, immediately above the line of setæ *b*. The glandular areas surrounding the pores are prominent and of a light colour. They expand the corresponding segment and join the large glandular papillæ of segment 16 and small ones of segment 14 (figs. 3 & 4). The small flat spermatophores were present near the line of setæ *a* on segment 25 (fig. 4).

The clitellum is much swollen, embracing the segments 23–33 (=11), but only slightly developed on the ventral surface (figs. 3 & 4). The intersegmental grooves are distinct. The first and the last clitellar segments are only glandular on the dorsal surface, between the lines of setæ *b*, and are considerably narrower than the other segments, attaining only a half of their size. There are no dorsal pores in the region of the clitellum. The tubercula pubertatis very distinct, on segments 29–32 (=4), at approximately one-third of the distance between the setal lines *b* and *c*. They are separated from the other parts of the clitellum by two deep longitudinal grooves which run along the tubercula pubertatis, which are divided by the intersegmental grooves into four nearly equal parts (fig. 3).

Two pairs of free testes and sperm-funnels in segments 10 and 11. Ovaria and ovarial funnels in segment 13. Female pores invisible. Three pairs of seminal vesicles in segments 9, 11, and 12, hanging from septa 9/10, 10/11, and 11/12. The first pair is less developed than the other two. Two pairs of large round spermathecæ with very narrow and short ducts are situated in segments 10 and 11. The efferent ducts open in the intersegmental grooves 9/10 and 10/11 in the line of setæ *c*.

In the position of the clitellum this species resembles *D. handlirschi*, but it differs considerably in the position of the first dorsal pore and the tubercula pubertatis and in having a tanylobous prostomium and widely paired setæ.

Dendrobæna ganglbaueri (Rosa) var. *byblica* (Rosa).

Jesud Hamaalah, by Lake Huleh, 19. ii. 1936. Three specimens.

Near Lake Huleh, 19. ii. 1936. One abnormal specimen.

Allolobophora caliginosa (Sav.) var. *trapezoides* (Dug.).

Jesud Hamaalah, by Lake Huleh, 19. ii. 1936. Two specimens.

Beth Hakerem, near Jerusalem, v. 1938. Six specimens.
Ramoth Hashawim, xii. 1936. Two specimens.

Lumbricidæ, sp. juv.

Daganiah " A," between Lake Tiberias and Jordan outflow, E. bank. 3. ii. 1938, Twenty-nine specimens.

Oben Jarmuk, unten Daganiah am Jordan, 12. iii. 1938. One specimen.

Kfar Ivri, 7 km. N.E. of Jerusalem, 13. ii. 1938, " Humus aus Höhlen." Numerous immature specimens.

Kirjath Anavim, xii. 1935, 13 km. W. of Jerusalem. One specimen.

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XLVII.—*A new Snake of the Genus* Anomochilus *from the Malay Peninsula.* By MALCOLM A. SMITH, Department of Zoology, British Museum (Natural History).

Anomochilus leonardi, sp. n.

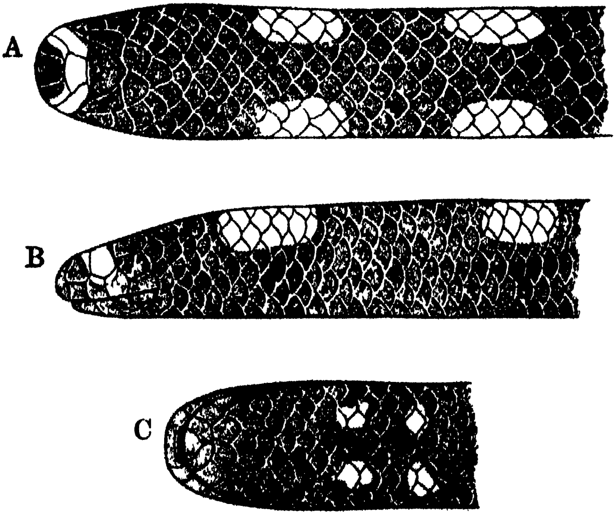
Description of the Type.—Head small, not distinct from neck ; eye minute ; rostral higher than broad, extending well on to the upper surface of the snout ; an azygous shield separating the nasals and prefrontals from one another ; frontal semicircular in shape, broader than long, about twice as large as the supraocular ; a single large temporal shield ; four supralabials, third highest, touching the eye, fourth longest. Scales smooth, in 17 : 17 : 17 rows ; ventrals 222, scarcely larger than the adjacent shields ; subcaudals 7.

Colour dark, purplish brown, with large, distant, whitish, rounded or oval spots, paired or alternating with one another on either side of the vertebral line; belly with large, irregular, white spots; a light bar across the snout; a large, white patch (red in life) covering most of the tail.

Total length 228, tail 7 mm.; width of body 7 mm.

Anomochilus leonardi is closely related to *A. weberi*; it differs in having fewer scales round the body, fewer ventrals, and in having an azygous prefrontal shield.

Type, female, British Museum, 1940.4.20.1, collected at Sungei Ngeram, near Merapoh, N. Pahang, Malay Peninsula, at about 800 feet altitude, by Mr. G. R. Leonard, after whom it is named.



A, Dorsal, B, lateral, and C, ventral views of *Anomochilus leonardi*, sp. n. ×3.

The paratype, also a female, from KualaTahan, N. Pahang, 750 feet altitude, does not differ in any important particulars from the type. The frontal shield is smaller and about as broad as long; there are 223 ventral shields and 7 subcaudal. The coloration is the same, with, in addition, some light mottling along the ventral shields.

Total length 227 mm.; width of body 5·5 mm.

It will be retained in Raffles Museum.

The coloration of *A. leonardi* appears to be almost identical with that of *A. weberi*, of which De Rooij gives a figure in Rept. Indo-Austral. Archipel. ii. 1917, p. 35. The white flank-line which she shows is faintly indicated in some parts of the body of *A. leonardi* by a series of dots.

The genus *Anomochilus* * has now two species, and I am indebted to Dr. L. D. Brongersma, of the Rijksmuseum, Natuurlijke Historie, of Leiden, for some information concerning the genotype, *A. weberi*. In addition to the type a second specimen has been obtained at Tanangtala, Ophir district, Padang Highlands, Sumatra, and is recorded in Zool. Meded. vi. 1922, p. 239. The scale-counts of these specimens are as follows, and not as recorded :—

Type : scales 17 : 19 : 19 ; V. 242 ; C. 6.
2nd ex. : scales 17 : 19 : 19 ; V. 248 ; C. 7.

Lack of material prevents any examination of the internal structure of *A. leonardi*, but I count three maxillary and three mandibular teeth in the front of the mouth. An excellent X-ray photograph, taken by Dr. Reynolds of Charing Cross Hospital, fails to show any trace of pelvic bones or femur.

XLVIII.—Hispinen *aus dem Britischen Museum.*—III. Teil. *Amerikaner.* 84. *Beitrag zur Kenntnis der* Hispinen (*Coleoptera*, Chrysomelidæ). Von Erich Uhmann, Stollberg, Erzgebirge.

Neue Arten.

1. *Oxychalepus centralis.* Paraguay, Brasilien.
2. *Xenochalepus discernendus.* Mexiko.
3. *Octuroplata bella.* Amazonas.
4. —— *bohemani.* Amazonas.
5. *Octotoma nigra.* Brasilien.
6. *Probænia triquetra.* Columbia.
7. *Uroplata spaethi* (figs. 1–3). Brasilien (Bahia), Uruguay.
8. *Temnocthispa jocosa.* Amazonas.

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* *Anomochilus* Berg, Comm. Mus. Nac. Buenos Aires, 1901, p. 289 (subst. name for *Anomalochilus* Lidth de Jeude, preoccupied).

VERZEICHNIS MEINER IN FOLGENDEM ERWÄHNTEN BEITRÄGE.

20. Fol. Zool.-Hydr. i. 1930.
61. Festschrift Strand, Riga, i. 1936.
68. Festschrift Strand, Riga, iii. 1937.
71. Proc. Roy. Ent. Soc. London, B, 7. 1938.

BERICHTIGUNG.

In meinem 71. Beitrage, Proc. Roy. Ent. Soc. Lond. B, 7. 1938, p. 115 muss es unter Nr. 27, statt "*Dactylispa vexatrix*" "*Hispa vexatrix*" heissen.

1. *Stethispa lineata* Uh.

1, Cayenne (coll. Fry); 1, Britisch-Guyana: Essequibo R., Moraballi Creek, 17. ix. 1929. Oxford Univ. Exped. Bisher nur Amazonas.

2. *Stethispa conicicollis* Baly.

1, Cayenne. Ist im Britischen Museum mit dem Typus verglichen worden.—Mittel- und Hinterschenkel winklig erweitert. Schienen an der entsprechenden Stelle geschwungen.

3. *Clinocarispa subhomalina* Uh. (71. p. 111).

1, Amazonas: St. Paulo, Bisher nur Pernambuco.

4. *Chalepus flexuosus* Guér.

1, Bolivia: Sta. Cruz de la Sierra (coll. Laferté (*Odontota flexuosa* Reiche) Dieses Stück halte ich für den wirklichen *Ch. flexuosus* Guér., Beschreibung und Fundort stimmen genau mit ihm überein. Es gleicht völlig den Stücken, die ich bisher als *Ch. robusticornis* Pic bestimmt habe, womit aber nicht gesagt sein soll, dass *Ch. robusticornis* Pic mit *Ch. flexuosus* identisch wäre, es scheint die von Pic beschriebene Art doch von *Ch. flexuosus* verschieden zu sein.

In meinem 61. Beitrag über *Chalepus* ist Folgendes zu ändern:

(1) p. 620. Nr. 24 bezieht sich nicht auf *flexuosus* sondern auf *modestus* Ws.

(2) ebenda: an Stelle von *robusticornis* muss *flexuosus* stehen. Der Satz "Ich möchte . . . vorgelegen haben könnte" muss wegbleiben.

(3) p. 618. Nr. 17: statt *robusticornis* muss es *flexuosus* heissen. Weise hatte richtig bestimmt.

(4) p. 627 muss es im Schlüssel unter 52 (53) statt "*robusticornis*" *flexuosus* heissen. Die beiden Aberrationen fallen natürlich weg.

(5) p. 628 muss unter 66 (67) "*flexuosus* Guér." gestrichen werden.

5. *Chalepus putzeysi* Chap.

Brasilien: 1, Rio Negro: Lages, vi. 1874 (Trail), 1, Amazonas: St. Paulo.—Die schwarze Mittelbinde des Halsschildes ist sehr schmal. Alle Schenkel mit hellem Basalfleck.

5 *a*. *Chalepus putzeysi* Chap. ab. *A*.

3, Amazonien: Prainha, 1873 (Trail).

Mittelbinde des Halsschildes stark rückgebildet, bei 2 Stück zu einem kleinen schwarzen Strich vorm Schildchen, bei 1 St. ganz geschwunden. - Bei allen 5 Stücken ist die schwarze Seitenbinde des Halsschildes oben geschwunden. -Bei 1 Stück ist der Skutellarfleck mit der Spitzenbinde durch eine Nahtbinde, die bis zur 1. Rippe reicht, verbunden.

6. *Oxychalepus centralis*, sp. n.

Late ovatus, costis elytrorum nitidulis, niger, prothorace flavo-testaceo, macula magna centrali nigra, elytris flavo-testaceis, sutura usque ad medium, vitta mediana transversa in costa prima interrupta in tertia parte apicali nigris, subtus pro- et mesosterno, macula basali femorum anticorum flavo-testaceis.—Prothorace transverso, parce punctato, lateribus medio angulatis, subopaco; elytris costa tertia medio longe interrupta, regulariter punctato-striatis, apice rotundatis, ibi denticulatis, dentibus nonnullis parum majoribus.—9 × 3·75 mm.

Dem *O. confinis* Ws. ähnlich, aber in den Decken breiter, mit weniger auffallenden grösseren Zähnen an ihrem Hinterrand, durch den schwarzen Fleck auf der Mitte des Halsschildes leicht erkennbar.—Breit-oval, Kopf und Halsschild matt, letzteres am Hinterrand etwas glänzend, Decken mit glänzenden Rippen. Schwarz, Halsschild gelbbraun mit schwarzem Mittelfleck, beim Holotypus auch die erweiterte Mitte des Seitenrandes schwarz, Decken gelbbraun mit schwarzer Ankerzeichnung, die beim Holotypus nur auf der 1. Rippe, beim

Paratypus um je eine Punktreihe breiter unterbrochen ist, Spitzendrittel schwarz mit konvexem Vorderrand. Auf der Unterseite Vorder- und Mittelbrust und ein Basalfleck auf den Vorderschenkeln gelbbraun.—Stirn mit feiner Mittellinie und schwachen Seitenfurchen, matt gewirkt; Fühler wie bei *O. confinis* Ws., stark, die beiden Basalglieder von der Seite quer, 3–5 einander gleich, zylindrisch, 6 ein wenig kürzer, Endglied so lang wie 3–6.—Halsschild quer, mit in der Mitte gerundeten Seiten, die nach vorn schwach konvergieren, Vorderecken vorragend, Scheibe zerstreut, kräftig punktiert.—Decken regelmässig skulptiert, 3. Rippe in der Mitte weit unterbrochen, Hinterecken völlig verrundet. Seitenrand gesägt, Spitzenrand unregelmässig gezähnt, mit 2–3 wenig grösseren Zähnen.—Mittelschienen mit einem Zähnchen an der Spitze.

2 ♀. Holotypus: Paraguay: Chaco, Nanawa (*A. Pride*); Paratypus: Brasilien: Santarem (in meiner Sammlung).

7. *Xenochalepus discernendus*, sp. n.

Elongato-ovatus, subtus nitidulus, supra capite nitido, prothorace interstitiis punctorum nitidis, elytris nitidulis. Supra niger, capite nitore metallico, prothorace flavo-testaceo, vitta mediana interdum antice abbreviata nigra, elytris macula magna humerali intus obliqua, marginem lateralem attingente et ad medium extensa flavo-testacea, subtus niger, prosterno testaceo macula nigra post coxam excepta, mesosterno in medio et metasterno antice flavo-testaceis, hoc colore interdum reducto.—Fronte juxta oculos linea forti impressa, medio leviter depresso; prothorace transverso, postice excavato, lateribus convergentibus, leviter bisinuatis, fortiter et dense punctato, linea mediana subtili; elytris ut in *X. contubernali* Baly sculpturatis et denticulatis.—6–7·5 mm.

Diese Art ist dem *X. contubernalis* Baly sehr ähnlich, unterscheidet sich von ihm sofort durch den glänzenden Halsschild, der dicht und stark punktiert ist, und dessen Trennungswände der Punkte meist sehr scharf sind, bei *X. contubernalis* ist der Halsschild matt, und die Trennungswände sind breiter.—Halsschild gelbbraun mit schmaler schwarzer Mittelbinde, die sich nach vorn stark verschmälert und bei 2 Stück dort abgekürzt ist, sodass ein rundlicher Basalfleck bleibt.—Decken mit gelbbraunem Schulterfleck wie bei *X. contubernalis*, ohne Subhumeralfleck. Sonst gleichen sich die Decken beider Arten in Skulptur und Bezahnung völlig.—Mittelschienen mit verschieden starkem Zahn an der Spitze (♂, ♀ ?). Klauenglied mit Haftzahn.—Weise hielt die Art für *X. contubernalis*.

Holotypus und 2 Paratypen, Mexiko (*Flohr-Schenkung*), Mus. Berlin. 1 Paratypus im Britischen Museum aus Mexiko : Acapulco, Guerrero (*Höge*).

8. *Octuroplata bella*, sp. n.

Der *O sinuosa* Chap. sehr ähnlich, aber Hinterwinkel der Decken vollständig verrundet, Glied 1–6 der Fühler mit einigen Punkten, glänzend, bei *O. sinuosa* ist das 1. und 2. Glied matt schagriniert und das 3.–6. gerieft, schwach glänzend. Färbung fast wie bei *O. sinuosa*, aber Stirn und Hals in der Mitte gelbbraun, bei *O. sinuosa* ist die Stirn schwarz und der Hals seitlich mit je einem gelbbraunem Fleck versehen. Auf den Decken ist die metallische Zeichnung innen geradlinig auf der 4. Punktreihe, nur am Ende erweitert sie sich nach innen zu einer undeutlichen Querbinde, etwa vorm Spitzenviertel. Naht schwach metallisch. Hinterrand schmal abgesetzt.—8 mm.

2, Amazonas : Ega (coll. Baly).

9. *Octuroplata bohemani*, sp. n.

Elongata, subnitida, flavo-testacea, antennis, capite, scuto nigris, collo prothoraceque vittis tribus nigris, una mediana, duabus lateralibus, elytris signaturis cyaneis : vitta angusta suturali usque ad tertiam partem postremam, vitta marginali laterali in humero et in medio processus usque ad costam secundam emittente, macula dentem elytralem obtegente et ramo vittam suturalem extremam attingente, vitta marginali transversa, apicali. Subtus flavo-testacea, vitta laterali metasterni et medio ultimorum sternitorum nigris.—Prothorace transverso, fortiter punctato, lateribus rotundatis, indistincte undulatis, postice transverse impresso ; elytris dente postico forti, margine postico subrecto.—8 mm.

Unterscheidet sich von den mir bekannten *Octuroplata* Arten (68. p. 454) durch die spitzen Hinterwinkel der Decken.—Schwach glänzend, gelbbraun, Fühler, Kopf und Schildchen schwarz, Hals und Halsschild mit 3 sich entsprechenden schwarzen Längsbinden: eine Mittel- und 2 Seitenbinden. Decken mit blaumetallischer Zeichnung: Naht schmal bis zu drei Viertel der Deckenlänge; Randstreif mit der 3. Rippe, der auf der Schulter und in der Mitte je einen Fortsatz bis auf die 2. Rippe und auch auf die 4. Punktreihe entsendet; Deckenzahn und von ihm aus eine Schrägbinde, die sich ein- und vorwärts bis zum Ende der Nahtbinde hinzieht; Hinterrand. Unterseite gelbbraun, auch der Kopfschild, Seiten- und Hinterbrust und die Mitte der letzten Sternite schwarz.—Kopf nur sehr undeutlich vom Hals abgesetzt, vor die Augen vorgezogen, mit Mittelfurche. Fühler zur Spitze schwach verdickt, Glied 1 stark, 2 schmäler, kürzer, rundlich, 3 schlank, konisch, länger als 1, 4=5, jedes kürzer als 3, 6 kürzer als 5, 7 so lang wie 3, dicker, 8 so lang wie 4–7, letzteres am Ende zugespitzt, aber nicht so scharf und allseitig wie bei der Gattung *Oxyroplata* Uh. (68. p. 454).—Kopfschild glatt, dreihöckrig, lang.—Halsschild quer, mit gerundeten, undeutlich gebuchteten Seiten, mit scharfen Vorderecken, stark punktiert, mit sehr feiner Mittellinie und hinten quer eingedrückt.—Decken parallel, an den Hinterecken mit starkem, etwas gewölbtem, dreieckigem Zahn, dessen Spitze rückwärts gerichtet ist und mit dem Nahtwinkel etwa in gleicher Höhe liegt, mit 3 Rippen, zu denen in der Spitzenhälfte noch ein Stück einer 4. kommt, mit Skutellarreihe und vorn 8 und hinten 10 regelmässigen Punktreihen, auf dem 3. (Schulter-) Streif sind sie vor der Zusatzrippe durch Zusatzreihen gestört. Seitenrand regelmässig gesägt, Hinterrand fast gerade, gezähnt. Zwischenraum V auf der Schulter und Naht von Rippenhöhe.—Klauenglied mit dem Toment des Vorgliedes abschneidend, vor den Klauen erweitert. Vorderschienen an der Spitze verdickt, Mittelschienen gekrümmt.

2, Amazonas (coll. Baly).

10. *Octotoma nigra*, sp. n.

Elongata, nitidula, nigra, antennis, linea angusta mediana prothoracis, margine apicali elytrorum pedibusque fulvis, elytris in costa prima una vel duabus maculis indistinctis ferrugineis.—Prothorace fortiter et dense punctato, medio

transversim elevato, ibi vix lævi, lateribus fere rectis, paulum convergentibus.—Elytris pæne regulariter punctato-striatis, costis tribus interruptis, costa prima in basi abbreviata, bis depressa-interrupta, secunda post medium fortiter interrupta.—3·5 mm.

Mit *O. crassicornis* Ws. und *O. brasiliensis* Ws. (Arch. Natg. A. 87. 1921, p. 270–) verwandt, besonders mit letzterer. Von *O. crassicornis*, von der mir die Typen vorliegen, unterscheidet sie sich ausser durch die Farbe durch viel dünnere Fühler und weniger stark und weniger oft unterbrochene Rippen, sodass die Decken viel regelmässiger skulptiert sind; von *O. brasiliensis* unterscheidet sie sich ausser durch die Farbe durch die 1. Rippe, die nicht viermal unterbrochen ist, auch die anderen beiden Rippen sind regelmässiger und weniger oft unterbrochen (ex Weise und nach einer von mir angefertigten Zeichnung des Typus aus dem Deutschen Entomologischen Institut Berlin-Dahlem)—Schwarz, schwach glänzend, Fühler, Spitzensaum der Decken und Beine gelblich-rot, eine schmale Mittellinie auf dem Halsschild und ein oder zwei Fleckchen auf der 1. Rippe undeutlich und unbestimmt rostrot.—Stirn matt, äusserst fein schagriniert, mit feiner Mittellinie. Kopfschild von der Seite schwach erhaben.—Fühler dünn, zur Spitze deutlich verdickt, ohne Schmal- und Breitseite, Glied 1=2, stark, 3 dünner, schlanker, länger als 2, 4 fast gleich 5, jedes kürzer als 3, 6 schwach quer, kürzer als 5, 7 verdickt, so lang wie 3, quer, 8 über doppelt so lang wie 7, ellipsoidisch zugespitzt, dicker als 7.—Halsschild quer, dicht und stark punktiert, in der Mitte quer gewölbt, die Wölbung mit einigen Punkten oder ganz punktiert, mit feiner Mittellinie, Seiten nach vorn schwach konvergent, fast gerade, mit scharfen, vorstehenden Vorderecken.—Decken hinter den Schultern mehr oder weniger verengt, an der Spitze einzeln abgerundet, schmal abgesetzt, an der Naht ausgeschnitten, mit 8 fast regelmässigen Punktreihen, 7. und 8. in der Mitte vereinigt, Skutellarreihe da (je 2 Punkte). 1. Rippe an der Basis, in und hinter der Mitte niedergedrückt, so dass sie aus 3 Teilen besteht; 2. Rippe knapp hinter der Mitte unterbrochen, vor ihr mehr oder weniger undeutlich niedergedrückt; 3. Rippe schwach, nicht unterbrochen, mit der 2. vor der Spitze deutlich vereinigt, Schulterraum

(V. Raum) von Rippenhöhe, nach innen mit Zusatzreihe.—Seitenrand regelmässig gesägt, Hinterrand unregelmässig und undeutlich gezähnt.—Klauenglied mit Haftzahn.—4, Brasilien : Bahia.

11. *Probænia triquetra*, sp. n.

Elongata, flavo-testacea, subtus rufo-testacea, antennis, vittis tribus prothoracis nigris, elytris signaturis viridicœruleis : macula scutellari, vitta apicali et laterali, hac pone medium interrupta, macula triquetra in tertia parte postica secundæ costæ. Costa tertia cum quarta indistincte conjuncta, elytris dente acuto.—7·5 mm.

Diese Art müsste nach der bisherigen Auffassungsweise zu *Uroplata* gestellt werden, weil die 3. und 4. Rippe sich vor der Spitze so gut wie nicht vereinigen, aber die Bezahnung der Vorderschenkel sowie die ganze Tracht (Habitus) zwingt uns, sie zu *Probænia* zu ziehen. Sie ist der *P. pici* Uh. (20. p. 249– f. 9) sehr ähnlich und vielleicht nur eine südliche Rasse von ihr.

Gelbbraun, Unterseite rötlich-gelbbraun. Schwarz : Fühler, 3 schmale Binden auf dem Halsschild, Beine nur auf den Hinterschienen angedunkelt. Decken mit metallisch-grünlicher oder bläulicher Zeichnung, die noch weiter als die von *P. pici* rückgebildet ist, denn der dreieckige Fleck auf der Spitzenhälfte der 2. Rippe steht allein. Die Zeichnung besteht aus einem Schildchenfleck ; einem Schulterfleck, der mit einer Seitenbinde vereinigt ist, die bis zur Mitte des Deckenseitenrandes reicht und bei zwei Stücken sich am Ende nach innen nach der 2. Rippe zu erweitert ; einem dreieckigen Fleck zu Beginn des Spitzendrittels auf der 2. Rippe, seine Verbindungen zur Seitenrandbinde und zur Spitzenbinde sind nur ganz schwach angedeutet ; einer Spitzenbinde, die den Deckenzahn mit bedeckt und bei einem Stück in der Mitte des Hinterrandes auf den Zähnen unterbrochen ist.—Stirn sehr dicht schagriniert, matt. Kopfschild im Profil pyramidenförmig. Fühler ohne Besonderheiten. Halsschild trapezisch, Seitenrand fast gerade, Scheibe dicht punktiert. Decken mit spitzem, dreieckigem, fast flachem Zahn, seine Spitze liegt vor dem Nahtwinkel. Mittelschienen stark gekrümmt. Klauenglied mit Haftzahn.

1, Columbia: Bogota (coll. Laferté), Holotypus, 1, Magdalena (coll. Baly). Bei einem weiteren Paratypus ist die Deckenzeichnung dadurch etwas vollständiger, dass durch etwas dunklere Färbung die Mittel- und hintere Querbinde etwas mehr angedeutet sind. Naht angedunkelt bis zum Dreiecksfleck. Zahn der Hinterecke etwas länger und schlanker.—Bei einem 4. Paratypus sind die beiden Querbinden deutlicher, Naht ebenfalls bis zum Dreiecksfleck dunkel, letzterer bleibt aber immer isoliert.

12. *Uroplata spaethi*, sp. n. (Figs. 1–3.)

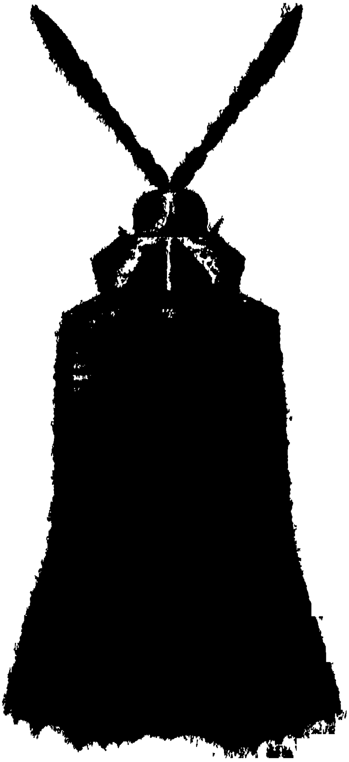
Cuneata, supra opaca, subtus nitidula, nigra, clypeo, fronte, scuto, prothoracis linea mediana et utrinque vitta obliqua, basi elytrorum anguste et interstitio octavo humerali, epipleuris sub humero, basi femorum, sterno medio, lateribus abdominis flavo-testaceis.—*Uroplatæ fuscæ* Chap. similis, sed elytris costa secunda medio longe depressa, apice ampliatis, angulo postico acuto, non prominente, margine apicali diverse et irregulari dentato, in angulo suturali emarginato; antennis articulis 3.–5. striatis.—5·5 mm.

Gehört wegen der zusammengedrückten Schienen in meinem Schlüssel der *Uroplata*-Arten (68. p. 454) nach Gruppe 8 neben *U. fusca* Chap., *holosericea* Ws. und *borgmeieri* Uh. Ausser der *U. fusca* Chap. der *U. borgmeieri* Uh. (68. p. 462–) am ähnlichsten, hat aber nicht abgerundete, sondern spitze Hinterwinkel und einen deutlich gezähnten Hinterrand der Decken.

Schwarz, matt gewirkt, 2 Flecke auf dem Halsschild, je eine Längsbinde aussen neben der 1. Rippe und hinter der Mitte eine Querbinde, die beide Längsbinden verbindet, samtschwarz. Gelbbraun: Kopfschild, Stirn, Schildchen, auf dem Halsschild eine schmale Mittelbinde und je eine schräge Seiten-Binde, die vorn an der Mittelbinde beginnt und nach der Schulter gerichtet ist, eine schmale Querbinde auf der Basalkante der Decken, die sich auf der Schulter auf der 4. Rippe ein Stück nach innen entlang zieht, das Basaldrittel der Schenkel, Mitte der Brust und Seiten des Bauches, Epipleuren der Decken unter der Schulter.—Kopf ohne Punkte, Kopfschild mit Höcker.—Fühler halb so breit wie die Stirn, ohne Breit- und Schmalseite, zur Spitze verdickt, Glied 1=2, Glied 3 fast doppelt so lang wie breit, 4 etwa so lang wie 5, 6=7, etwas quer, Endglied etwa so lang wie die

3 vorhergehenden. Glied 3–5 längsgerieft.—Halsschild quer, Seiten in der Mitte stumpf gewinkelt, sodass dort die breiteste Stelle des Halsschildes ist, Vorderecken kegelförmig vorragend. Scheibe mit starken, zerstreuten, wenig auffallenden Punkten, ahnlich *U. fusca*.—Schildchen rundlich.—Decken von der Mitte nach hinten geradlinig erweitert und der Rand flach abgesetzt, ihr Hinterrand einzeln in leichten Bogen flach abgesetzt und gerandet, mit starken, breiten, unregelmässigen Zähnen. In der Bildung des Hinterrandes zeigen meine beiden Paratypen ziemliche Abweichungen, bei dem aus coll. Thomson

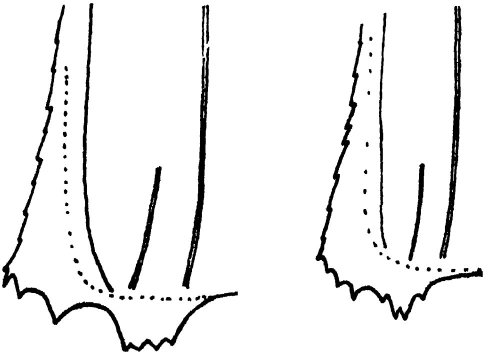
Fig. 1.



Uroplata spaethi, sp. n. Holotypus.

(fig. 2) ist auf beiden Decken eine grössere Lücke zwischen den Zähnen, bei dem aus Minas Geraes: Uberaba (fig. 3) ist der Hinterrand sehr breit abgesetzt und etwas schwächer gezähnt (solche Abweichungen zeigen auch *Pentispa*-Arten), an der Nahtecke ist die flache Erweiterung breit ausgerandet. Vorder- und Hinterrand stossen winklig zusammen, ohne dass aber der Hinterwinkel besonders vorgezogen wäre.—Punktreihen regelmässig, Rippenbildung wie bei *borgmeieri*, Rippe 1 stark und vollständig, 2 an der Basis und an der Spitze vorhanden,

Fig. 2. Fig. 3.



Uroplata spaethi, sp. n.

Fig. 2.—Paratypus aus coll. Thomson.
Fig. 3.—Paratypus aus Uberaba.

3 stark, nur auf der Schulter, 4 fein und vollständig. Beine wie bei *U. fusca*, Vorderschienen breitgedrückt und zur Spitze verbreitert, bei *U. borgmeieri* sind sie viel schwächer erweitert. Klauenglied mit Haftzahn.—Holotypus: Bahia (Bondar leg. 2313), in meiner Sammlung. Paratypen: 1, Montevideo. 1, Sa. Catharina. 1, ohne Fundort in meiner Sammlung. 1, Minas Geraes: Uberaba. Dieses Stück ist dunkelbraun, die Samtzeichnung schwarz. Unterscheidet sich durch die Bildung des Spitzenteiles der Decken, sonst wie die übrigen Typen.

13. *Heterispa vinula* Er. ssp. *bogotensis* Ws.

12 Stück, davon 2, Columbia: Magdalena Valley, El Banco (*C. Allen*) und 3, Sta. Martha.

Der schwarze Subhumeralfleck ist durch einen etwas dunkler braunen oder rötlichen Fleck vertreten. Bei einem Stück von Sta. Martha ist der Raum zwischen der innersten und äussersten Rippe angedunkelt.

14. *Octhispa nigriceps* Ws. (aberr.).

2, Amazonas.

Kopf auf der Stirn gelbbraun. Naht vorn bis zur Querbinde metallisch. Beinbildung des Männchens wie bei *O. gracilis* Ws.

15. *Octhispa bondari* Uh.

2, Rio de Janeiro.

Dem Holotypus gleich, aber im 3. Zwischenstreif hinter der Mitte eine Zusatzreihe. Deckenzahn etwas stärker nach aussen vorragend.

16. *Temnocthispa deplanata* Wat. (*Octhispa*).

Ein Kotypus. E. Ecuador: Sarayacu (*C. Buckley*).

Kopf stark abgeschnürt. Kopfschild schmal, glatt, mit 3 Höckern vor den Fühlern, der mittelste am grössten. Fühlerglied 1–5 stark quer, 1 am breitesten. Halsschild an der Basis mit 2 Quereindrücken, die eine schmale Quererhabenheit einschliessen. Punkte der Reihen auf den Decken quer, diese ganz regelmässig, ohne Zusatzpunkte. Raum V auf der Schulter von Rippenhöhe. 9. und 10. Reihe in der Mitte nicht vereinigt. Vor jeder Klaue das Klauenglied mit starkem Zahn. Klauen mit dem Toment abschneidend.

17. *Temnocthispa jocosa*, sp. n.

Elongata; postice parum ampliata, nitidula, supra antennis capiteque nigris, prothorace nigro-metallico, vitta mediana scutoque fulvis, elytris cyaneo-metallicis, in singulis elytris vitta subreniformi basali, macula mediana obliqua, fascia transversa subapicali fulvis; subtus fulva, apice tibiarum anticarum infuscato, tarsis paratypi nigris.—Antennis validis, articulis 1–6 punctatis, capite postice leviter constricto, clypeo processu valido; prothorace transverso, antice attenuato, fortiter punctato, medio lævi, linea transversa profunde impressa; scuto transverso, lævi; elytris parallelis, angulo postico mediocriter ampliato, rotundato, regulariter costatis et punctato-striatis.—7·5–8·5 mm.

Temnocthispa jocosa ist der Art *T. truncata* F. sehr ähnlich, ist aber anders gezeichnet und die Hinterwinkel der Decken sind nicht spitz, sondern verrundet. 3. Zwischenstreif der Decken ohne Zusatzpunkte.—Kopf und Fühler schwarz, Halsschild schwarz-metallisch, seine Mitte mit breiter, rötlichbrauner Binde, Schildchen und einige Flecke auf den blaumetallischen Decken von derselben Farbe: der 1. fast nierenförmige beginnt fast an der Basis der 1. Rippe und bedeckt ihr Basaldrittel und die entsprechende Länge der 2. und 3. Punktreihe, hinten biegt er nach aussen um, erreicht die 2. Rippe und die 5. Punktreihe; hinter diesem, gleich hinter der Deckenmitte, liegt ein schräg gestellter, ovaler Fleck, der auf der 2. Punktreihe beginnt und sich schräg nach aussen über die 1. und 2. Rippe hinweg bis auf die 6. Reihe erstreckt, der 3. Fleck besteht aus einer gemeinsamen Querbinde beider Decken vor der Spitze von dem Ende der einen 3. Rippe bis zu dem der anderen. Die entstandenen dunklen Querbinden schmal. Unterseite rötlich-gelbbraun, Spitze der Vorderschienen angedunkelt. Tarsen des Paratypus schwarz.—Kopf vom Halsschild durch eine Querlinie schwach abgesetzt, am Innenrand der Augen mit starkem Porenpunkt, beim Paratypus mit eingedrückter Mittellinie.—Fühler dick, gleich stark, fast so dick wie die Stirn breit, ohne deutliche Längs- und Breitseite, 1. Glied von der Seite quer, mit vorgezogener, unterer Vorderecke, 2. Glied kürzer, quer rundlich, 3. Glied leicht konisch, länger als 1., 4 bis 6 einander fast gleich, quer, jedes etwa so lang wie 2, 7 etwas länger als 6, 8 lang, fast so lang wie die 4 vorhergehenden Glieder. Glied 1–6 deutlich punktiert.—Halsschild gewölbt, an der Basis doppelt so lang wie breit, nach vorn verengt, mit S-förmigen Seiten, vorn dicht und stark punktiert, in der Mitte mit feiner Mittellinie, an dieser glatt, vorm Hinterrand mit tief-eingedrückter Querfurche.—Schildchen quer, glatt.—Decken an der Hinterecke etwas erweitert, dort flach abgesetzt und abgerundet, Hinterrand flach konvex, sodass der Nahtwinkel hinter dem Aussenwinkel liegt, mit regelmässigen Rippen und Punktreihen, Naht und 5. Zwischenraum auf der Schulter von Rippenhöhe.—Klauenglied vom Toment des Vorgliedes überragt. Kopfschild mit 3 Höckern, der mittelste sehr stark vortretend.

Holotypus: Amazonas. Paratypus: Para. Beide aus coll. Baly.

Von jeder sp. n. wurde ein Belegstück mir freundlichst überlassen.

XLIX.—*A Palæoniscid Fish* (Elonichthys davidi, *sp. n.*) *from the Newcastle Coal Measures, New South Wales.*

By Sir ARTHUR SMITH WOODWARD, F.R.S.

[Plate XI.]

I AM indebted to the late Mr. John Mitchell, of the New South Wales School of Mines, for the opportunity of studying a new Palæoniscid fish, which was found about 200 feet below the Borehole seam of the Newcastle Coal Measures in the Parish of Tarro, County Northumberland, New South Wales (3). As the fish seems to belong to a typically Carboniferous genus, while the Newcastle Coal Measures are considered to be of Upper Permian age (2), this fossil is of some interest. It is shown of nearly two-thirds the natural size in Pl. XI., and when complete must have measured about 26 cm. in length.

The fish is fusiform, with the greatest depth at the origin of the dorsal fin, and this depth equals about one-half the length from the pectoral arch to the origin of the caudal fin. A fragment of a second specimen shows that the lower border in front of the pelvic fins is not compressed to a sharp edge, but to a pair of blunt edges bounding a flattened narrow ventral area. The upper caudal lobe is comparatively long and slender, forming nearly one-third of the total length of the fish.

The head is imperfect, but it seems to have been rather low, and its length, including the opercular apparatus, cannot have exceeded the maximum depth of the trunk. The postero-inferior part of the lower jaw is marked by coarse longitudinal ridges of ganoine; and the vermiculating ridges on the cranial roof are partly subdivided into tubercles. The mandibular suspensorium is much inclined downwards and backwards, so that the gape of the mouth was wide. The shape of the operculum is not clear, but it must have been narrow and deep.

Except the pectorals, which are absent from the fossil, all the fins are well displayed. The stout, closely apposed fin-rays are articulated to the base, and bifurcate to very fine subdivisions distally. The articulated portions are not much longer than broad, and never broader than long. Each ray is strengthened by one coarse longitudinal ridge of ganoine; some of the anterior rays are also marked by very fine longitudinal striæ; some further back bear a series of little oblique ridges of ganoine. At the origin of each fin there are four or five short basal fulcra, which increase in length backwards and are marked with very fine longitudinal striæ. These basal fulcra are evidently in series with the enlarged ridge-scales which are in front of them. The foremost one or two fin-rays are short compared with the next, which is the longest; while on and beyond their tips a row of closely arranged slender fulcra fringes the front border of the fin. The triangular dorsal and anal fins are much deeper than long, the former with 25 rays, the latter with almost as many rays. The dorsal fin is opposed to the space between the pelvic and anal fins; its greatest depth is about equal to the depth of the trunk at its insertion, and slightly exceeds that of the anal fin. The caudal fin is a little distorted, so that its exact shape is not observable. The pelvic fins are smaller than the anal, each with 15 rays.

For a Palæoniscid fish the rhombic scales are comparatively thin, and as preserved in the fossil many exhibit their fine concentric lines of growth. None are displaced, but they are not deeply overlapping. There are not less than 40 transverse series of scales between the pectoral arch and the base of the caudal lobe, and about half of these are in front of the origin of the dorsal fin. They are a little deeper than long on the anterior portion of the flank, but become nearly equilateral dorsally and ventrally and on the flank below the dorsal fin, and a few are longer than deep just above the base of the anal fin. The anterior flank-scales are covered with an ornament of large smooth ridges of ganoine, which often branch upwards and forwards where they end in broad rounded lobes. The ridges are more or less fused together in the posterior part of the scales, and the posterior edge is not serrated. On the equilateral scales the same ornament is usually less distinct, and some of the scales in the caudal region seem to be nearly smooth. The lateral line is conspicuous in the fossil on account of the abrasion of most of the scales which it traverses. The oat-shaped scales on the upper caudal lobe are marked with the usual longitudinal ridge. A series of eight or nine enlarged ridge-scales extends from the occiput to the origin of the dorsal fin, all slightly overlapping and ornamented with longitudinal ridges which converge at the posterior apex. There are also traces of similar enlarged ridge-scales at the origin of the anal and caudal fins.

As the fish thus described lacks the cheek, jaws, and pectoral fins it cannot be referred with certainty to its proper genus, but there is nothing in the fossil to distinguish it from *Elonichthys.* Indeed, all the parts preserved agree with those of *Elonichthys* as interpreted by Traquair (4) after he had examined the type-specimen of the type-species, *E. germari*, from the Upper Carboniferous Coal Measures of Wettin, near Halle, Germany, now in the University Geological Museum at Halle. The minor characters of the fins and scales, however, show that the Newcastle specimen belongs to a new species, which may be appropriately named *E. davidi* in honour of the late Sir T. W. Edgeworth David, F.R.S. It is readily distinguished from the two species of *Elonichthys* which have already been described (5) from the Carboniferous of Victoria, Australia. It is very distinct from the species which Aldinger (1) considers have been wrongly assigned to this genus.

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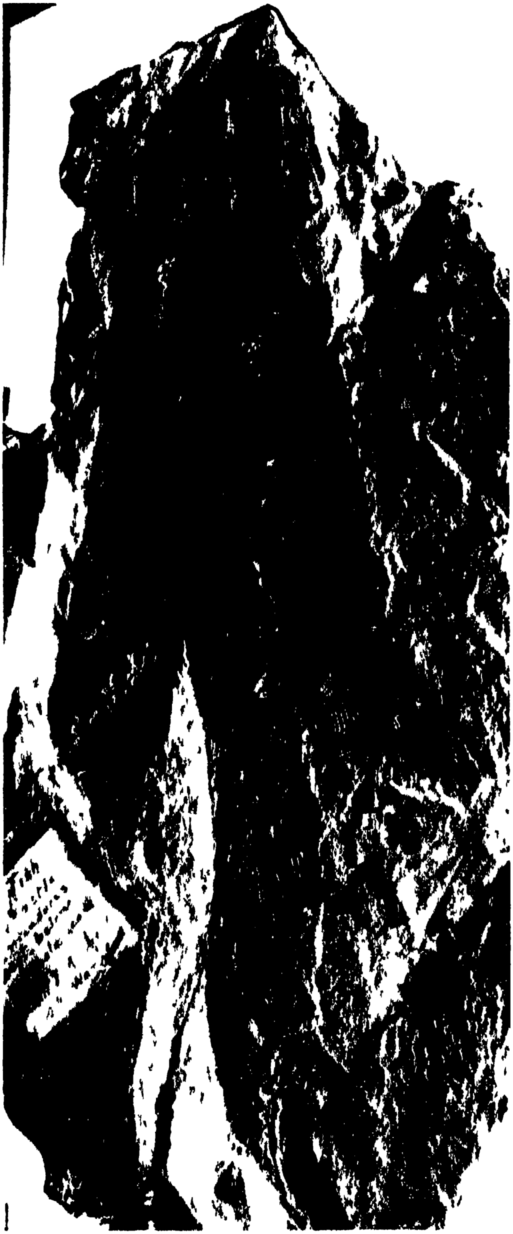
EXPLANATION OF PLATE XI.

Elonichthys davidi, sp. n.; type-specimen in right side view, about two-thirds nat size. Newcastle Coal Measures (Upper Permian); Parish of Tarro, County Northumberland, New South Wales, Australia.

SMITH WOODWARD *Ann. & Mag. Nat. Hist. S. 11. Vol. VI. Pl. XI.*



Elonichthys davidi, sp. n.

ANNALS AND
OF
NATURAL HISTORY.

[ELEVENTH SERIES.]

No. 36. DECEMBER 1940.

◆

L.—*New Species of the Cirripede Genus* Oxynaspis, *commensal with* Antipatharia. By A. K. Totton, Department of Zoology, British Museum (Natural History).

I. Introduction.

When describing a new Oxynaspid commensal of *Antipatharia* in 1923 I drew attention to some others that were lying undescribed in the collections of the Natural History Museum. Some of these I proceeded to describe in manuscript, at the same time augmenting descriptions of two old species which had not been characterized with sufficient precision. A large number of drawings were made, but official work on Cœlenterata prevented me from completing the task. In the meantime three new species of *Oxynaspis* have been described—*O. connectens* Broch, 1931, *O. pacifica* Hiro, 1931, and *O. pulchra* Nilsson-Cantell, 1935. There is no hope of finishing my work on this genus, so my notes are published in their present form.

First I must refer to the vexed question of the origin of the spines which cover all species. Both Annandale (1914), Broch (1922), and I have noted the way in which the Antipatharian tissues closely invest the peduncle and capitulum of the Oxynaspid, for which observations we drew the inference that the spines were laid down by the Antipatharian. Now I believe this to be only a partial truth, for the outer chitinous sheath with its spines may be stripped from some Oxynaspids, leaving another spiny membrane behind. The spines of this inner membrane fit into the cavities of the hollow spines of the outer one. But although the chitinous axes of *Antipatharia* and the bases of their normal spines are hollow I think the cavities in the spines of the outer membranous investment of Oxynaspids are too large to be accounted for in this way, and I am inclined to think that these outer hollow spines are the chitinous investment of pre-existing Oxynaspid spines. Thus the views of Aurivillius (1894), Annandale (1909), and Nilsson-Cantell (1921) can be brought into line with Darwin's original view, since corroborated, that the spines are laid down by the Antipatharians. Broch (1931) described *O. connectens*, which, though neither invested by nor growing on an Antipatharian, nevertheless bore a spiny cuticle. The question was reviewed by Stubbings in 1936.

A survey of the Oxynaspids that occur on Antipatharians shows that they can be divided into two categories, one with normal and the other with reduced scutal valves. The reduction is not apparently to be correlated, as in certain other genera, with special biological conditions, for, as far as one can see, the conditions under which members of both categories live—that is, within a protective investment laid down by living Antipatharian tissues—are identical. This paradox leads me to suggest that we are dealing with a heterogeneous group. The only reason why I hesitate to institute two subgenera, one containing the genotype *O. celata* Darwin and all those species with unreduced valves, and the other for Stebbing's species *aurivillii* and those species with reduced scuta, is that *O. patens*, with its reduced valves, appears to be more closely related to the *celata* group. The early developmental stages of certain of the species of the second group are suggestive of the fact that they are descended from ancestors with normal scuta.

There has always been some doubt about the natural relationship between *Oxynaspis* and other genera of pedunculate cirripedes. When I wrote these notes there were no published observations on the development of any species of this interesting genus, but I was able some years ago to seriate what are without doubt developmental stages of several species. In at least one of these—*O. indica* Annandale—it appears that the primordial valve is near the apical or distal (posterior) end of the carina in the early stages (fig. 12, C). It is only in later stages that the carina grows distad. In this respect *Oxynaspis* is more like the Scalpellidæ than the Lepadidæ. It seems, then, open to doubt that *Oxynaspis* is descended from a *Pœcilasma*-like ancestor.

Again, it has been alleged that the primordial valve of the scutum of Oxynaspids has become shifted secondarily from a basal position to the middle of the occludent margin, and that the original basal margin has become rotated so as to come into alignment with the occludent margin. In early stages of *O. indica*, however, the primordial scutal valve appears to be apically (posteriorly) situated, and not basally (anteriorly). In this respect, too, *Oxynaspis* resembles the Scalpellidæ rather than the Lepadidæ. Indeed, were it not possible to deduce from seriated specimens such a sequence of events we should still be without a clue as to how the Lepadidæ with basal umbones to the carina and scuta are related to the Scalpellid stock, in which the umbones were originally apical.

Broch has stated his opinion that both *Lepas* and *Pœcilasma* are more primitive than *Oxynaspis* because of its specialized habitat, which has led to the reduction of the scuta in some species; but I submit that, in spite of this secondary adaptation, the *Oxynaspis* stock may be a more primitive one than the Lepadid, members of which lead a normal life. In other words, it is possible that in the primitive stock a basal (forward) shift of the scutal and carinal umbones may have started before some of them took to a special habitat and became Oxynaspid progenitors, and before the rise of the characteristic Lepadid stock in which this shift has gone still further.

There is one more fact to note in connection with the special habitat adopted by Oxynaspids. It may not be merely a question of selecting a special object for fixation, for specimens are often found attached to other Oxynaspids, although it is true that these are covered with Antipatharian tissues. It is probably the Antipatharian environment which is sought after, and not fixation to an Antipatharian branchlet. This idea has been discussed by Broch (1924) when treating of *Octolasmis lowei*. He there pointed out that it is the special environment rather than a particular host-tissue that is of paramount importance in fixation.

Although the shapes and arrangement of the valves appear to afford sufficient criteria for the discrimination of species, whenever possible I have included observations on appendages. But it has not been possible to make the study of the group on which this paper is based by any means an exhaustive one, although it is hoped that our knowledge has been carried a step further.

A large part of the material studied was dry, and has necessitated the use of caustic potash, a practice condemned by Broch. Even where spirit material is concerned it is often desirable to remove the Antipatharian tissues before a satisfactory view of the valves can be obtained. I fail to see that the use of caustic potash is undesirable. Referring to the stripping off of an outer spiny membrane, I am satisfied that I was not removing merely a part of the delaminated Antipatharian basis, although it is true that the axis can be split up in this way into successive laminæ.

II. DESCRIPTION OF SPECIES.

Family **Oxynaspididæ** Pilsbry, 1907.

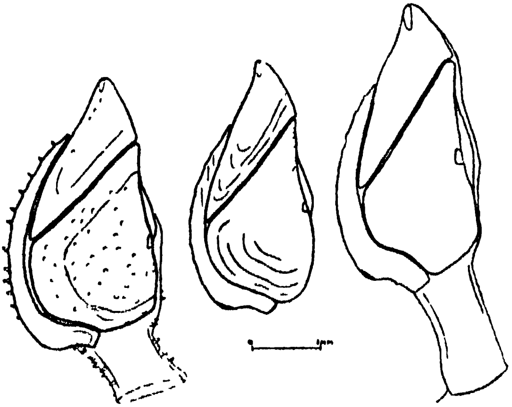
Genus OXYNASPIS Darwin, 1851.

The diagnosis given by Nilsson-Cantell (1921) can be accepted with one alteration, namely, that filamentary appendages, both dorsal and lateral, may be present.

1. *Oxynaspis cancellatæ*, sp. n. (Figs. 1 & 2.)

Description.—Valves not separated through reduction of scutum, bases of spines calcified. Tergum with acute basal (scuto-carinal) angle, scutal margin a little more than twice the length of occludent margin. Scutum not lobed, length of occludent margin exceeding that of the tergal. Carina with umbo well below middle, distal (tergal) limb being from three to four times as long as basal limb. Mid-dorsal line of distal limb markedly convex, and of basal limb concave. Angle between lines from umbo of tergum to rostral angle of scutum and from rostral angle of scutum to umbo of carina not less than a right angle. Caudal appendages absent. Filamentary appendages: two dorsals, posterior one long; one pair of very short ones at the base of the first pair of cirri.

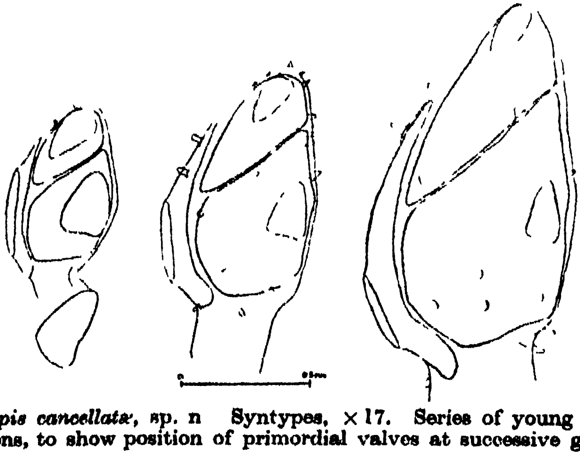
Fig. 1.



Oxynaspis cancellatæ, sp. n. Syntypes, × 9.

Remarks.—The types of this small species occur on the type-specimen of *Aphanipathes cancellata* Brook, British Museum Register no. 1890.4.9.7, coming from the Kei Islands.

Fig. 2.



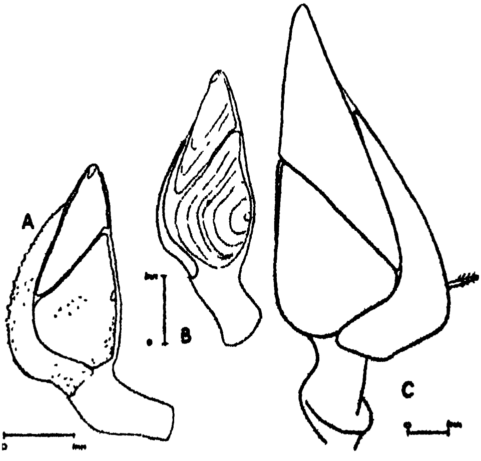
Oxynaspis cancellatæ, sp. n Syntypes, × 17. Series of young specimens, to show position of primordial valves at successive growth stages.

The species bears some resemblance to Broch's *O. celata* forma *japonica*, which I regard as a distinct species, *Oxynaspis japonica* Broch. This species has not been adequately figured, but from what I have seen of the types the carinal angle of the scutum seems to be acute, unlike that of *cancellatæ*, which is also readily distinguished by the possession of filamentary appendages, said to be absent in *japonica*.

2. *Oxynaspis alatæ*, sp. n. (Figs. 3–7.)

This is the largest known Oxynaspid. The type-specimens are attached to the dried holotype of *Aphanipathes alata* Brook, British Museum Register no. 1886.2.8.1, coming from Mauritius. The carina, which in young stages is slightly bowed and has very little depth dorso-ventrally, in mature specimens develops a very marked flexure and great depth.

Fig. 3.



Oxynaspis alatæ, sp. n. A, B, young paratypes, × 9; C, dry holotype, × 5·5.

Description.—Valves fitted exceptionally close together, with bases of spines calcified. Tergum with acute basal (scuto-carinal) angle, scutal margin only slightly longer than occludent margin. Scutum not lobed, rostral angle broadly rounded, carinal angle becoming less rounded

Fig. 5.

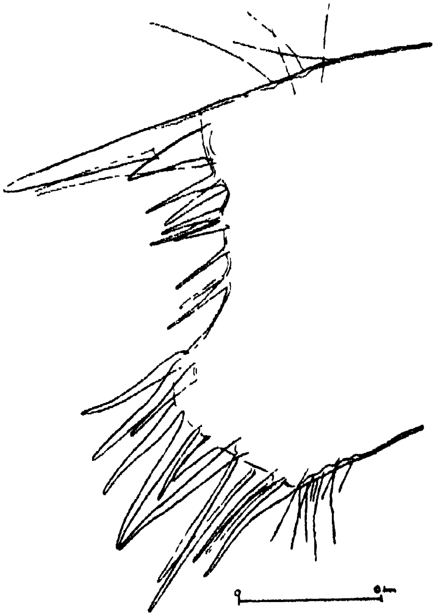


Fig. 4.

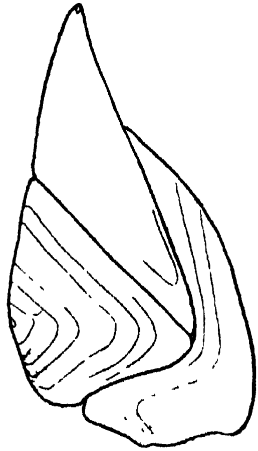


Fig. 6.

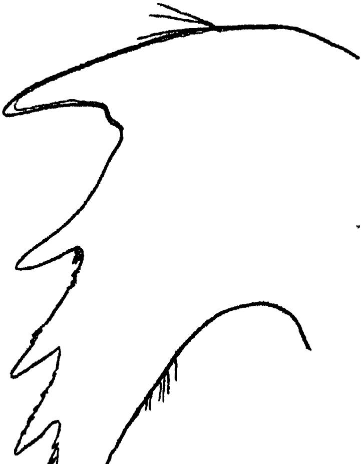


Fig. 7.

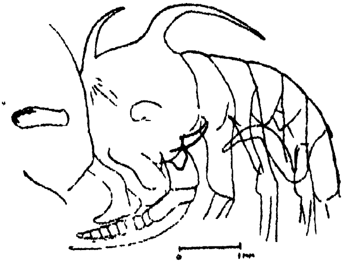


Fig. 4.—*Oxynaspis alatæ*, sp. n. Paratype × 5·5.
Fig. 5.—Ditto. Paratype, left maxillula, × 205.
Fig. 6.—Ditto. Paratype, left mandible, × 130.
Fig. 7.—Ditto. Paratype, showing filamentary appendages and boss between first cirri, × 9.

and more angular with age, umbo in middle of occludent margin. Carina with umbo well below middle, distal (tergal) limb about twice the length of basal limb ; rostral angles of basal expansion partly produced round peduncle. Peduncle relatively short, about half the length of the capitulum when dry. Caudal appendages absent. Filamentary appendages : two dorsals, posterior one long ; one pair of shorter laterals at base of first pair of cirri. Mandible with four teeth and acute pectinated proximal angle divided into two lobes. Maxillula with group of three strong and two smaller spines above the notch, six weak spines in the concavity below the notch, and thirteen on the prominent proximal angle. A single boss between bases of first cirri.

Remarks.—There are some three dozen specimens, all dry, ranging in capitular length from about 2 to 18 mm. A dry specimen bearing a dozen short branchlets of the Antipatharian on its carina has been detached as the holotype ; its measurements are as follows :—

	mm.
Maximum length of capitulum......	18
Maximum width of capitulum	7
Length of peduncle	8

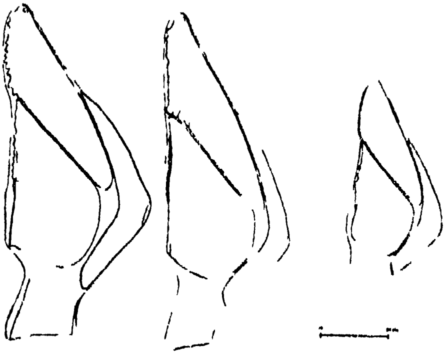
Young specimens of this species pass through a stage which closely resembles *O. cancellatæ* except for the tergum. Compared with that species the occludent margins of the terga of *O. alatæ* are relatively long and the distal limbs of the carina are relatively shorter and the whole of that valve is less slender in profile.

3. *Oxynaspis gracilis*, sp. n. (Fig. 8.)

Description.—Valves covering capitulum except for a small interspace between angle of carina and scutum. Tergum : length of occludent margin is five-sevenths that of scutal margin ; distal angle moderately rounded, only very slightly reflexed ; occludent margin in line with the corresponding margin of scutum. Scutum unlobed, rostral angle well marked, carinal margin broadly rounded, occludent margin straight. Carina : umbo about the middle, with two limbs of about equal length, rostral angle of basal expansion not produced round peduncle.

The type-locality is the "West Indies." The types were found on *Antipathella gracilis*, British Museum Register no. 1843.2.8.25.

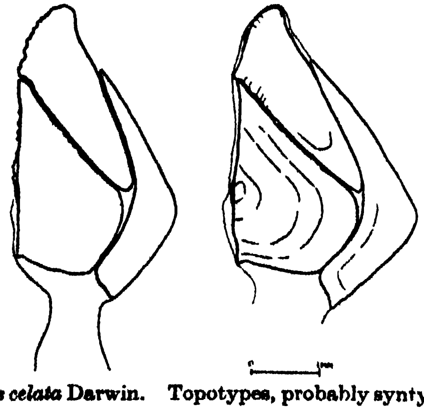
Fig. 8.



Oxynaspis gracilis, sp. n. Syntypes, × 9.

Remarks.—This species is remarkable for its slenderness, the length of the capitulum being two or more times its width. The occludent margins of scutum and tergum are in alignment and the scutal umbo central.

Fig. 9.



Oxynaspis celata Darwin. Topotypes, probably syntypes, × 9.

4. *Oxynaspis celata* Darwin. (Fig. 9.)

The opportunity has been taken to publish some new figures of examples of this species taken from an Antipatharian in the British Museum, *Aphanipathes woolastoni*, from Madeira, British Museum Register no. 1873.7.9.5. Without doubt this is the specimen from which Darwin removed his types. We shall regard these specimens as syntypes. It will be observed from the figures that the occludent margin of the tergum, which is half the length of its scutal margin, is at a distinct angle to the occludent margin of the scutum, and that its distal angle is broadly rounded and noticeably recurved. The distal limb of the carina exceeds by a half the length of its basal limb.

5. *Oxynaspis celata* Darwin var. *hirtæ*, nov.

(Figs. 10 & 11.)

On some specimens of *Parantipathes hirta* from the West Indies there are Oxynaspids which differ from typical *O. celata* in having a proportionately longer occludent margin to the tergum (one that is less curved and more nearly in line with that of the scutum) and a tergum the distal end of which is more acute. In the carina of this variety the distal limb may exceed twice the length of the basal limb. In a lateral view of the capitulum the basal margins of the carina and scutum are more nearly in alignment than in the typical *celata*.

Fig. 10.

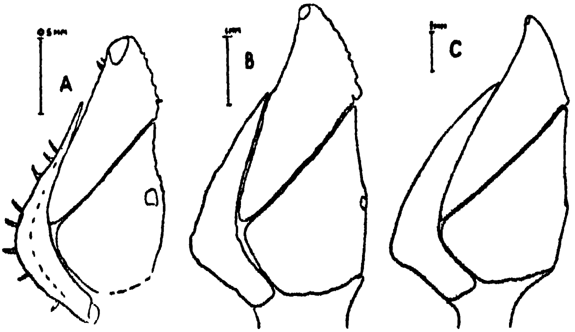


Fig. 11.

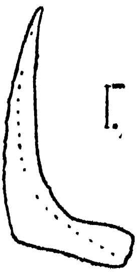


Fig. 10.—*Oxynaspis celata* Darwin var. *hirtæ*, nov.
Fig. 11.—Ditto. Carina, × 5·5.

There is one pair of filamentary appendages at the bases of the first cirri, but no boss between them.

6. *Oxynaspis indica* Annandale. (Figs. 12–15.)

The most striking character about the pink valves of this species is the imperfection of their margins, which gives rise as growth proceeds to series of radial furrows. In outline the valves resemble those of *O. celata* var. *hirtæ*, but the scuta are different in that the part of the occludent margin proximal to the umbo is relatively shorter and the rostral angle scarcely distinguishable. The basal margin of the scutum forms a fairly regular semicircle from the umbo to the proximal end of the tergal margin. The exterior face of the basal limb of the carina is generally distinctly concave, unlike that of the typical variety of *O. celata*, and even more so than in var. *hirtæ*. The rostral angles of its basal expansion, as in the typical variety but not as in var. *hirtæ*, are not produced, so that in a lateral view of the capitulum there is a distinct angle between the basal expansion of the carina and the

Fig. 12.

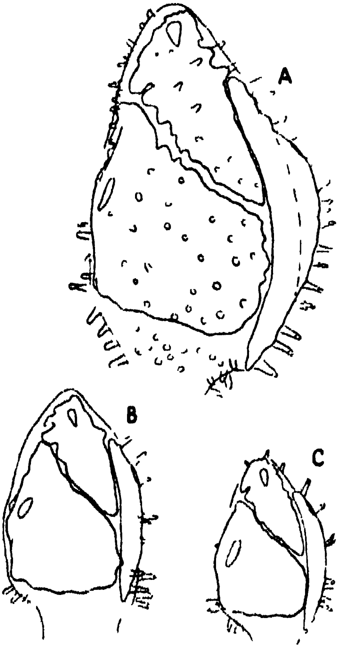


Fig. 13.

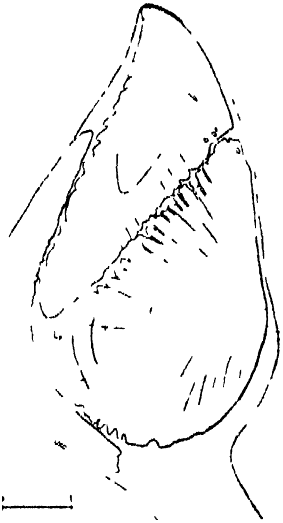


Fig. 12.—*Oxynaspis indica* Annandale. Series of young specimens, to show position of primordial valves at successive growth stages, × 34.

Fig. 13.—Ditto, from Tizard Bank, × 9.

basal margin of the scutum. This angle is seen also in the typical variety of *O. celata*, but not in var. *hirtæ*.

I have been able to seriate a number of young specimens from Mauritius whose carinæ provide us with some useful evidence (fig. 15) about the position of the umbo in various growth stages. In the youngest specimen, the length of whose capitulum is 0·7 mm., the umbo is quite close to the tergal or distal end. It is not till much later on that it is shifted by more rapid growth at the distal end to a median position, and finally to a point about one-third of the carinal length measured from the basal end.

Fig. 14.

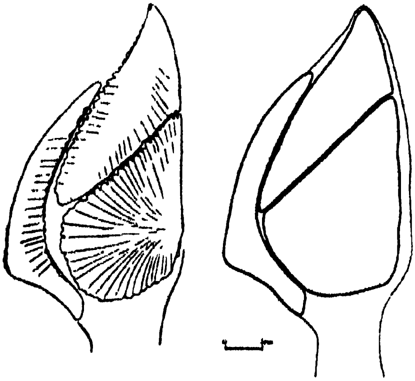


Fig. 15.

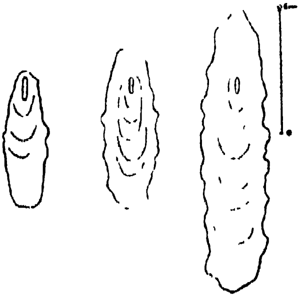


Fig. 14.—*Oxynaspis indica* Annandale, from E. African cable, × 5·5.
Fig. 15.—Ditto, from Mauritius. Series of carinæ of young specimens, to show position of umbo at successive growth stages, × 33.

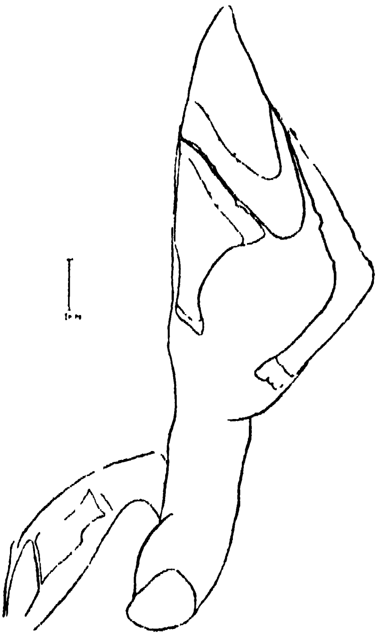
The significance of this is alluded to in some introductory remarks on p. 467.

The scutum in young stages resembles that of *O. celata*. Hiro's *O. pacifica* appears to be more closely related with *O. indica* than with the *aurivillii* group.

7. *Oxynaspis patens* Aurivillius. (Fig. 16.)

This species appears externally to be more closely related to the *celata* group, and might be considered intermediate between those species with normal and those with reduced scuta; but the carina is like that found in most of those in the first group, with umbo about the middle. The tergal margin of the scutum is of normal length, and reduction or slowing up of growth has only taken place in the centre of the carinal margin. I am indebted to the Director of the Rijksmuseum, Stockholm, for permission to re-examine the type, of which I give a sketch.

Fig. 16.



Oxynaspis patens Aurivillius. Type-specimen belonging to Rijksmuseum, Stockholm, × 7.

8. *Oxynaspis aurivillii* Stebbing. (Figs. 17–21.)

Redescription.—Valves well separated in adult but very slightly in youngest growth stages up to 0·7 mm. in capitular length. Tergum with occludent margin indented and about three-fifths of the length of the scutal margin in adult, or one-third or less in younger stages. Scutum irregularly rhomboid in adult, with sides more nearly equal in youngest stage, so that tergal margin is nearly as long as scutal margin of tergum, and carinal margin nearly meets the carina ; rostral angle of types not produced into a pronounced spur ; middle lobe divided, lower division elongated and acutely rounded, reaching lower (scutal) limb of carina at a point just within apex of lower limb, upper division obtusely rounded, scarcely separated from the upper (tergal) lobe. Carina with umbo well below middle, distal (tergal) limb being from two and a half to three and a half times the length of basal limb; chords of two limbs forming an angle of about 60° in adults but an angle of about 120° in young stages ; apex of each wing of lower limb of carina nearly meeting lower division of middle lobe of scutum in young stages, but growing beyond it in adult and extending more than halfway round peduncle.

Fig. 17.

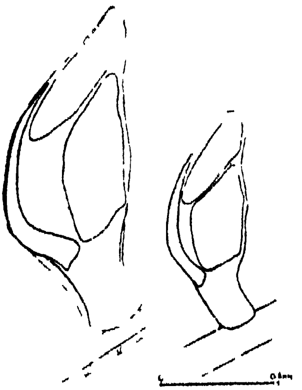


Fig. 18.

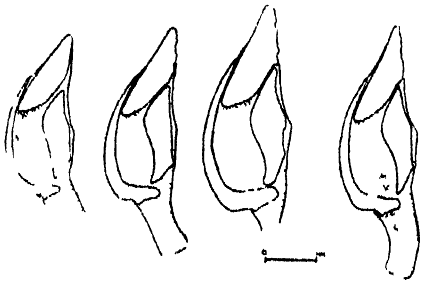


Fig. 17.—*Oxynaspis aurivillii* Stebbing. Young syntypes, × 33.
Fig. 18.—Ditto. Syntypes, × 7·5.

There is a pigmented stripe on the rostral side of the peduncle which forks above, one branch underlying each scutum. A lateral stripe runs up each side of the peduncle, passes under the basal expansion of the carina, runs obliquely across the uncovered part of the capitulum, to turn up parallel with the carina and end below the carino-scutal angle of the tergum. There is a patch under the exposed half of the scutal margin of the tergum.

Remarks.—Stebbing's original figure gives an incomplete idea of the shape of the scutum, because it does

Fig. 19

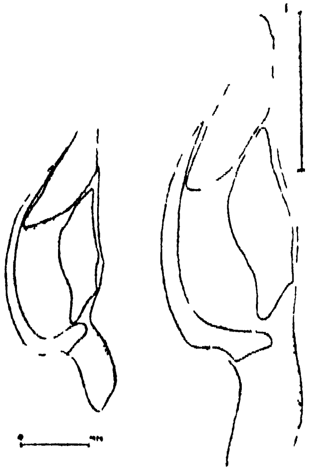


Fig. 20.

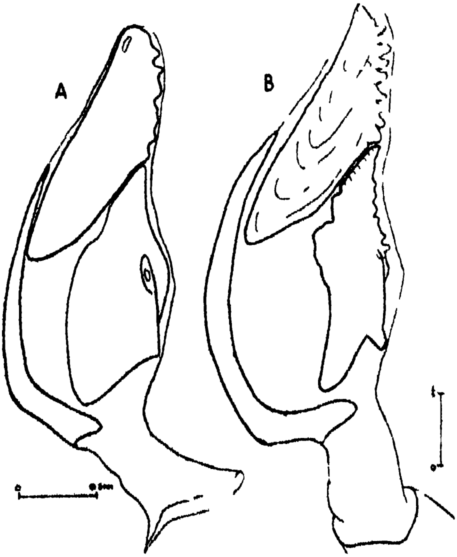


Fig 21

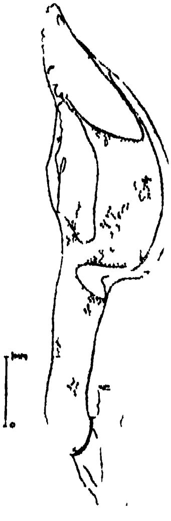


Fig 19.—*Oxynaspis aurivillii* Stebbing. Syntypes.
Fig. 20.—Ditto. A, young specimen, × 20, B, adult From E African cable, S. of Dar-es-Salaam
Fig. 21.—Ditto, from Macclesfield Bank, China Sea, 43 fath

not show that portion which overlies part of the rostral stripe and includes the rostral angle. I have re-examined the syntypes, which include young stages. I have also found specimens, young and adult, on a specimen of *Arachnopathes*, British Museum Register no. 1906.7.2.1, taken from the East African cable south of Dar-es-Salaam. In the largest of these specimens, which is twice the size of the types, the scutum shows a distinct rostral spur. Another specimen, British Museum Register no. 1927.2.10.1, from the Macclesfield Bank, China Sea, 43 fath., is hardly distinguishable from the types except by its greater size.

9. *Oxynaspis granti*, sp. n. (Figs. 22–25.)

Description.—Valves well separated in adult. Tergum with occludent and scutal margins nearly equal in length, occludent margin slightly sinuous. Scutum irregularly rhomboid, rostral angle produced into a prominent spur; middle lobe divided, lower division elongated and narrow, not approaching expansion of lower limb of carina so closely as in *O. aurivillii*, upper division short and obtusely rounded; upper (tergal) lobe with a straight tergal margin. Carina with umbo well below middle, distal (tergal) limb three times the length of basal limb; lateral expansions of basal limb greatly extended, nearly encircling peduncle.

Fig. 22.

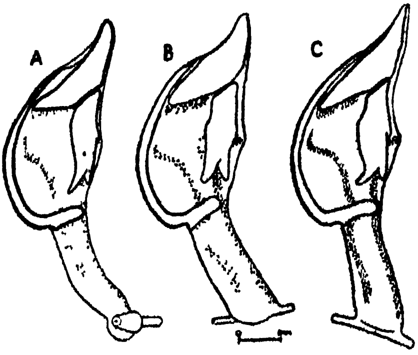


Fig. 23.

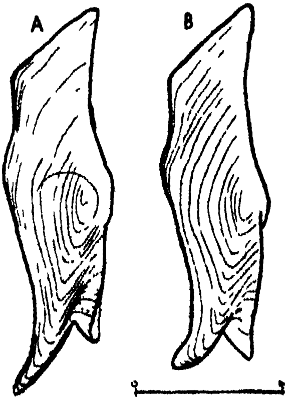
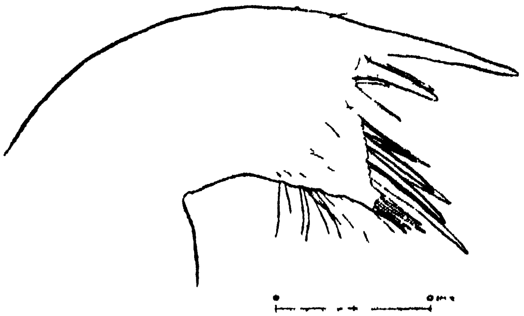


Fig. 22.—*Oxynaspis granti*, sp. n. A, B, syntypes; C, holotype, × 5·5.
Fig. 23.—Ditto, paratype. A, right scutum from inside; B, left scutum from outside, × 20.

Bands of pigment are distributed on peduncle and capitulum, as illustrated in fig 22.

Occurrence.—80 miles south of Penang, on Antipatharian from cable collected by the late Colonel D. St. J. Grant, I.M.S., in C.S 'Patrol.'

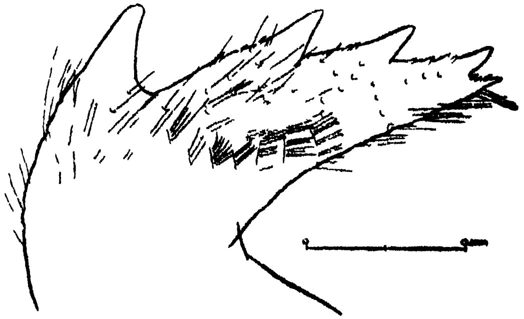
Fig 24.



Oxynaspis granti, sp. n., paratype. Right maxillula, × 205.

Remarks.—The species is related to *O. aurivillii* and *O. bocki* Nilsson Cantell, but the scuta of the three species are very different.

Fig 25.



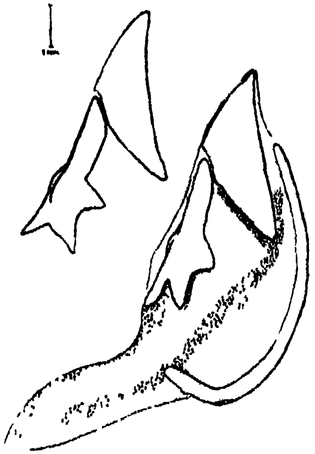
Oxynaspis granti, sp. n., paratype. Right mandible, × 200.

The stripes of pigment were well marked and regular. There are on each side two longitudinal stripes extending from near the base of the peduncle—that on the rostral side approaches nearest to the point of attachment—on to the capitulum. The rostral stripe ends between the rostral spur and the lower division of the middle lobe of the scutum. The carinal stripe crosses under the basal expansion of the carina, and after passing obliquely in a curved course over the central part of the uncovered area of the capitulum it turns up parallel with the carina to end some little distance away from the carino-scutal angle of the tergum. There is another pigmented band running parallel with that part of the scutal margin of the tergum that lies between its carino-scutal angle and the upper lobe of the scutum. Another lighter area lies in the division of the middle lobe of the scutum, and lastly there is a little transverse band between the scutum and the occludent margin, just below the umbo. Similar pigmented areas occur in *O. bocki* and *O. aurivillii*. Whether they can be used as specific characters or not has not yet been determined.

10. *Oxynaspis bocki* Nilsson Cantell. (Fig. 26.)

For comparison with *O. aurivillii* Stebbing and *O. granti* mihi I give sketches of two types kindly loaned

Fig. 26.



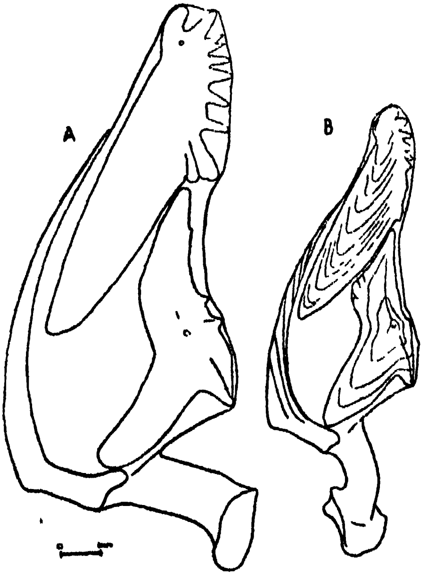
Oxynaspis bocki N. Cantell. Types from Zoological Museum, Upsala University. × 5·5.

to me by the Zoological Museum of Upsala University. The characteristic upper and lower divisions of the middle lobe of the scutum are well shown.

11. *Oxynaspis faroni*, sp. n. (Figs. 27–31.)

This species has less reduced scuta than any which exhibit reduction except *O. terræ-novæ* Totton. It is remarkable for having the umbo of both terga and scuta on the lateral surfaces far removed from the apical and the occludent margins respectively.

Fig. 27.



Oxynaspis faroni, sp. n.; A, holotype, × 5·5: B, paratype, × 3·5.

Description.—Valves partly separated through reduction of scuta. Tergum with occludent margin indented or lobed, apical margin produced beyond umbo, which lies on lateral surface of valve; scutal margin not greatly exceeding occludent in length. Scutum trilobed, middle lobe divided, lower division neither broadly rounded as in *terræ-novæ* nor very narrow as in a new species *granti*, described above, but finger-shaped, its axis parallel with that of tergum, resembling the basal part of that valve in shape; upper division of middle lobe short, generally divided by a notch from the upper (tergal) lobe; occludent margin produced beyond the umbo, so that this lies near the centre of the lateral surface of valve. Carina slender,

Fig. 28.

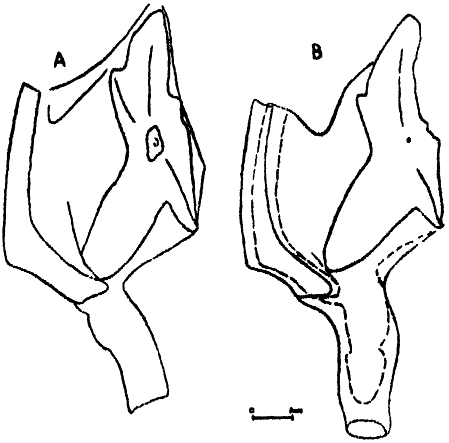


Fig. 29.

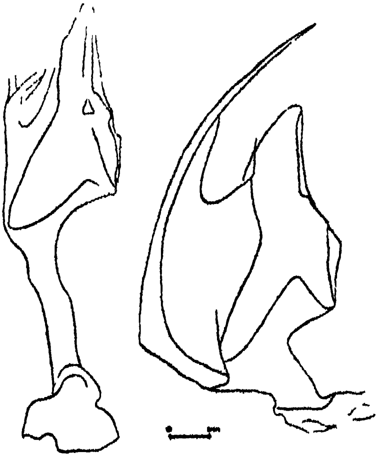


Fig. 28.—*Oxynaspis faroni*, sp. n., paratypes, × 5·5. B. Broken line shows outline before boiling in KOH.
Fig. 29.—Ditto, paratypes, × 5·5.

angular, distal limb from four to five times length of basal limb ; the chords of the two limbs nearly at right angles

Fig. 30.

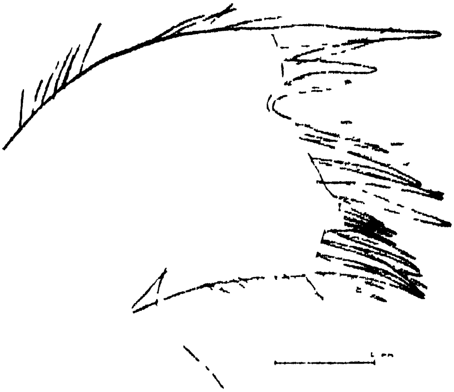


Fig. 31.

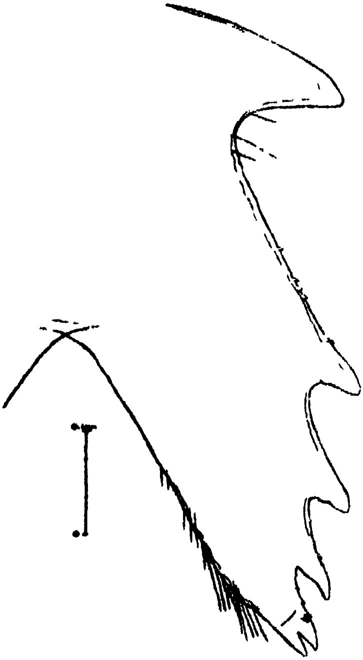


Fig. 30.—*Oxynaspis faroni*, sp. n., paratype. Right maxillula, × 130.
Fig. 31.—Ditto, paratype. Right mandible, × 130.

to each other, the distal limb only slightly bowed ; umbo well below centre. Lateral expansions of lower limb not much extended. Peduncle about half as long as capitulum when dry.

Mandible of normal proportions for genus, with four teeth and bifid lower point. Maxillula with usual group of five spines, two predominating above the notch. Four strong spines on each side below notch in centre third, with projecting lobe bearing four small spines below and double row of four stronger spines on lower point.

Remarks.—There are two whole specimens, of which the largest, 14 mm. long, is the holotype, and six other broken paratypes, all of which retain the scutum and the whole or part of the carina. They are all dry, and the contraction in circumference of the peduncle has drawn together the basal ends of carinæ and scuta. One is represented in dry condition (broken lines) and after swelling out to normal proportions in caustic potash (full lines) in fig. 28, B.

The gross measurements of the dry holotype are as follows :—

	mm.
Length of peduncle	3
Length of capitulum	12·8
Width of capitulum	5·6

The specimens occur on the type of *Antipathes lentispina* Brook, taken by H.M.S. ' Faron ' in the Red Sea.

LI.—*Preliminary Key to the* " Petrejus " *Section of the Genus* Passalus (*Coleoptera*, Passalidæ). By W. D. Hincks, M.P.S., F.R.E.S.

The term " *Petrejus* " is here used for a section of the subgenus *Passalus* s. str. Luederwaldt ‡ has tabulated the subgenera and sections of the genus *Passalus* F., and his keys should be used to place material in the correct section. His tables include the aberrant and annectant forms as well as the characters of the subgenera and sections, which therefore need not be repeated here. The terms used in the present key are those proposed by Gravely ‡.

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‡ Luederwaldt, H., 1931, " Monographia dos Passalideos do Brasil," Rev. Museu Paulista, xvii. pp. 1–262, pls. i. & ii.

The writer is indebted to Dr. Chapin for the loan of material from the United States National Museum (abbreviated in the key: Coll. U.S.N.M.) and to Mr. Arrow for specimens belonging to the British Museum (Coll. B.M.). Other material reported is contained in the Hincks and Dibb collection (Coll. H. & D.). Special acknowledgments are due to Mr. J. F. Zikan, of Campo Bello, Brazil, for valuable Brazilian specimens.

It should be clearly understood that the present key is a preliminary one, as several forms are unknown to me except from the often inadequate descriptions; these are marked *. Records of species new to several countries are included and are distinguished by †.

Full references to the literature will be found in the Passalidæ portion of Coleopt. Catalogus §.

Key to the Species of "Petrejus."

1 (2). Central tubercle long, projecting well beyond anterior margin of head, fused to median portion of head almost to anterior margin. Prominent outer tubercles together with projecting central tubercle giving a somewhat trident-like appearance. (*Cassius* Kuw., 1891.) Secondary tubercles present. Outer tubercles strongly, outer angles of head moderately, acute. Frontal ridges more or less horizontal to prominent inner tubercles. Parietal ridges present. Head surface impunctate. Lamellæ of antennæ moderately long. Puncturation of pronotum variable; underside of hind angles and sides with long hairs; anterior angles acute. Tufts of hair absent from shoulders of elytra; puncturation weak. Mentum impunctate medially. Mesosternal scars impunctate. Anterior intermediate areas of metasternum punctate and hairy; posterior intermediate areas punctate. L. 24 mm. Peru (*Kuwert*). Coll. H. & D.: Ecuador †: Mera;

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‡ Gravely, F. H., 1914, "An Account of the Oriental Passalidæ," Mem. Indian Mus. iii. pp. 177–353, 3 pls.; 1918, "A Contribution towards the Revision of the Passalidæ of the World," *l. c.* vii. pp. 1–144.

§ Hincks, W. D., and Dibb, J. R., 1935, 'Coleopterorum Catalogus,' cxlii. Passalidæ, pp. 118.

Bolivia : Coroico ; Peru : Chanchomayo, Rio Pachitea, Puerto Inca .. *pugionifer* Kuw. [(1891), 1898.

2 (1). Central tubercle not as above.

3 (4). Central tubercle concave at apex, subpedunculate. Secondary tubercles present on anterior margin of head. (*Rhagonocerus* Kaup, 1871.) Antennal lamellæ long. Frontal and parietal ridges obsolete. Anterior angles of head acute. Hair-tufts absent from shoulders. Lateral striæ of elytra strongly but not transversely punctured. Metasternum hairless ; posterior intermediate areas strongly punctate ; lateral areas narrow, dull, a little expanded behind. Mesosternal scars long, shallow and dull. Abdominal scars dull. L. 40–51 mm. Guiana, N. Brazil (*Kaup*). Coll. U.S.N.M. : Brazil : Porto Velho, Rio Madeira (*H. N. Burton* via *Mann*) ; Bolivia †: Isiamas Dec. (*W. M. Mann*, Mulford Biol. Expl. 1921–1922) .... *armatus* Perty, 1830.

4 (3). Central tubercle not concave at apex.

5 (10). Scars of mesosternum punctate and hairy.

6 (7). Secondary tubercles present on anterior margin of head. Central tubercle without dorsal sulcus. (*Lucilius* Kuw., 1881.) **petrejoides* Kuw., 1898. L. 34 mm. Surinam. **gladiator* Kuw., 1898. L. 36 mm. Guiana.

7 (6). Secondary tubercles rudimentary or absent. Central tubercle with dorsal sulcus. (*Synesius* Kuw., 1896.)

8 (9). Parietal tubercles obsolete. Anterior margin of head straight. Outer tubercles and outer angles of head moderately acute. Frontal ridges arising rather close to apex of central tubercle, extending to inner tubercles. Head polished, a few small punctures in depressed areas and frontal area. Antennal lamellæ long. Anterior marginal groove of pronotum expanded at apex. Hair-tufts absent from shoulders. Elytral punctures small. Metasternum punctate and hairy laterally ; posterior intermediate areas punctate. L. 35 mm. Colombia (*Kuwert*). Coll. H. & D. : 1 ex sine locus .... *confusus* Kuw., 1891.

9 (8). Parietal tubercles distinct. L. 28–30 mm. (Differs almost solely from *curtus* in having mesosternal scars punctate and hairy.) Ecuador (*Kirsch*). Coll. H. & D. : Ecuador,

Baños. (? *curtus* Gravely, 1918, nec Kaup. L. 23·3 mm. Colombia: Cauca Valley.) .... *alticola* Kirsch, 1885.

10 (5). Scars of mesosternum not punctate and hairy.

11 (20). Secondary tubercles present. Central tubercle often attenuate towards both base and apex. (*aduncus* group Luederwaldt ‡.)

12 (13). Sides of metasternum and/or episterna hairy. L. 28–30 mm. Peru (*Erichson*), Brazil (*Kaup*, *Kuwert*). (*obtusidens* Kaup, 1869.) .... *aduncus* Erichs., 1847.

13 (12). Metasternum hairless, except sometimes extreme anterior angles.

14 (15). Parietal tubercles large. Central tubercle short and broad. Outer tubercles and outer angles of head moderately acute. Frontal ridges and inner tubercles obsolete to moderately distinct. Frontal area with a few large punctures in front. Antennal lamellæ long. Pronotum impunctate except in or near scars and marginal grooves. Shoulders with short hair-tufts. Lateral elytral puncturation moderately strong but not transverse. Median portion of mentum, indistinct mesosternal scars and metasternum impunctate and hairless, except anterior intermediate and sometimes posterior intermediate areas. L. 27–28 mm. Brazil. Coll. H. & D.: Brazil, Itatiaya, 1100 m. in Cecropia and Cambara, 30. xi. 36 (*J. F. Zikan*) .... *sicatus* Burm., 1847.

15 (14). Parietal tubercles obsolete or weak. Central tubercle less short and broad.

16 (17). Hair-tufts of shoulders present. Frontal ridges usually distinct as far as inner tubercles. Outer tubercles strongly, outer angles of head moderately, acute. Central tubercle laterally compressed basally, less so towards apex. Puncturation of head slight. Antennal lamellæ moderately long. Sides of pronotum and expanded apex of anterior marginal groove strongly punctate. Elytral puncturation moderately strong. Mentum impunctate medially. Mesosternal scars dull or polished. Metasternum hairless except in anterior intermediate areas; posterior intermediate areas punctate; lateral areas narrow and

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‡ Perhaps falling here: **beinlingi* Kuw., 1891. L. 27 mm. Colombia, or may belong to another section.

linear throughout. L. 23–26 mm. Antilles, Mexico (var. *ancoriformis* Luederw., 1931), Guatemala, Colombia, Brazil. Coll. H. & D.: Mexico (*Truqui*), Venezuela †: Caracas. Coll. U.S.N.M.: Venezuela, Maracaibo. Coll. B.M.: Venezuela ..... *mucronatus* Burm., [1847.

Size larger, 26–30 mm. Build more robust. Head surface smoother. Central tubercle tending to be more elevated in front, less clearly defined behind. Pronotal puncturation reduced, anterior angles less acute. Intermediates occur. Coll. B.M.: Venezuela †, Montanas del Guacharo. var. *peregrinus* Kuw., [1898.

17 (16). Hair-tufts absent from shoulders.

18 (19). Anterior angles of head trispinose. L. 18–30 mm. Ecuador (*spinosus* Arrow, 1907) .... *spinulosus* Hincks, [1934.

19 (18). Anterior angles of head unispinose. Frontal ridges obsolete. Central tubercle horizontal, long, widely free. Outer tubercles acute. Inner tubercles prominent. Antennal lamellæ moderately long. Anterior angles of pronotum acute. Elytral puncturation not transverse. Mentum punctate medially. Mesosternal scars polished, shallow, impunctate. Metasternum hairless; posterior intermediate areas usually punctate; lateral areas narrow and linear throughout. Abdominal scars polished, scarcely punctate. L. 23–30 mm. Venezuela, Colombia. Coll. H. & D.: 1 ex. sine locus. Coll. U.S.N.M.: Bolivia †, Turnupasa Dec. (*W. M. Mann*, Mulford Biol. Expl. 1921–22, deformed example 25 mm. long). Coll. B.M.: Peru †: Chanchamayo .... *pugionatus* Burm., [1847.

20 (11). Secondary tubercles absent or rudimentary. Central tubercle generally widest behind. (*nasatus* group Luederwaldt.)

21 (28). Elytra fused, contours rounded.

22 (23). Parietal tubercles obsolete. L. 34 mm. Colombia .... **sagittarius* Smith, 1852.

23 (22). Parietal tubercles distinct.

24 (25). Central tubercle strongly sulcate at base. Frontal ridges weak. Shoulders with tufts of hair. Frontal area rugose-punctate. Lateral groove of pronotum very narrow, impunctate; marginal groove strongly expanded distad and strongly punctate; scars round, deep, and strongly punctate. L. 30 mm. Peru.................. **inca* Zang, 1905.

25 (24). Central tubercle not or weakly sulcate at base. Frontal ridges strong. Shoulders without tufts of hair. Pronotal lateral grooves punctate; scars impunctate or weakly punctate.

26 (27). Frontal area with numerous large punctures. Elytral puncturation weaker. Size smaller (26·5 mm.)... **rotundatus**, sp. n.

27 (26). Frontal area somewhat rugose but without punctures. Elytral puncturation stronger. Size larger (30–32 mm.). Colombia .... **luederwaldti**, sp. n.

28 (21). Elytra not fused.

29 (42). Shoulders without distinct hair-tufts, at most with short sparse pubescence. Parietal tubercles small or absent.

30 (33). Frontal ridges arising from near apex of central tubercle (free apex of which is therefore short).

31 (32). Size larger (33 mm.). Posterior intermediate areas of metasternum with numerous punctures. Prothoracic puncturation confined to scars and marginal grooves. North Brazil .. **coordinatus* Kuw., 1891.

32 (31). Size smaller (24–25 mm.). Posterior intermediate areas of metasternum less extensively punctured. Puncturation of prothorax more extensive. Anterior margin of head entire. Outer tubercles and outer angles of head obtuse. Frontal ridges extending to anterior margin. Inner tubercles small. Frontal area about three times as broad as long, punctate anteriorly. Antennal lamellæ moderately long. Angles of pronotum rounded; hind angles moderately hairy below; sides strongly punctured. Lateral elytral striæ moderately strongly punctured. Median portion of mentum and mesosternal scars impunctate. Anterior intermediate and lateral areas of metasternum punctured and hairy. Coll. B.M.: Peru. (*peruvianus* Arrow, 1907 *nec* Kuwert, 1898.) ... *zangi* Hincks, 1934.

33 (30). Frontal ridges arising well before apex of central tubercle.

34 (37). Central tubercle more or less strongly sulcate ‡.

35 (36). Frontal area about three and a half times as broad as long. L. 22 mm. Brazil (*Kuwert*) .... **fractus* Kuw., 1891.

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‡ I am very doubtful of the value of this character, used by Luederwaldt following Kuwort; *fractus* seems to differ little, if at all, from *curtus*, examples of which occur, I feel sure, with a distinct sulcus at the base of the central tubercle.

36 (35). Frontal area about two to two and a half times as broad as long. L. 18–21 mm. (16·5 mm. _Gravely_). Venezuela, Colombia .... *_gracilis_ Kaup, 1869.

37 (34). Central tubercle not or indistinctly sulcate ‡.

38 (41). Frontal area about twice as broad as long.

39 (40). Frontal area matt. L. 25 mm. (23·3–24·7 mm. _Gravely_). Ecuador.. *_recticlypeatus_ Kuw., [1898.

40 (39). Frontal area polished. L. 24 mm. Brazil, Colombia .... *_nasutus_ Perch., 1835 §.

41 (38). Frontal area three or four times as broad as long. Anterior margin of head more or less excised medially. Outer tubercles, acute. Outer angles of head more or less obtuse. Frontal ridges distinct as far as inner tubercles then obsolete, or complete throughout. Frontal area granulate to rugose-punctate. Central tubercle acute, laterally compressed, not or shortly grooved behind. Parietal tubercles prominent. Antennal lamellæ moderately long. Pronotum impunctate (except in scars and marginal grooves) to strongly punctate laterally; marginal groove a little expanded at apex; pubescence of underside of hind angles generally scanty. Lateral elytral punctuation moderately strong. Median portion of mentum and indistinct mesosternal scars impunctate. Anterior intermediate and lateral areas of metasternum punctate and hairy; posterior intermediate areas punctate or impunctate. Abdominal scars impunctate. L. 21–27 mm. (_nasutus_ Kuw., 1898, et Moreira, 1925, _nec_ Perch., 1835), Brazil, Colombia. Coll. B.M.: Ecuador †: Prov. Loja, Zamora (_Prof. C. Carrion_). Colombia: Manizales (_A. M. Patino_, Coll. R. Oberthür). Coll. U.S.N.M.: Ecuador, Baños, alt. 1800 m. F. Campos R. Peru †: Huascaray, Sept. 21–22, 1911 (_C. H. T. Townsend_). Coll. H. & D.: Ecuador, Baños. Colombia: Muzo......... _curtus_ Kaup, 1869 ||.

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‡ See footnote ‡ on p. 491.

§ Although both Luederwaldt (1931) and Hincks and Dibb (1935) include a reference to Gravely (1918) under _nasutus_, it is highly probable that Gravely had a different species before him in drawing up his short description and figure.

|| _Curtus_ Kaup, as here understood, is rather unsatisfactory. Perhaps two or more closely allied but distinct species are confused under it. The available material is, however, so scanty that no further data can

42 (39). Shoulders with distinct tufts of hair.

43 (44). Central tubercle curved, sulcate and more or less bituberculate dorsally. Anterior margin of head excised medially. Frontal ridges sometimes extending to obtuse inner tubercles, sometimes complete. Parietal tubercles massive. Frontal area about twice as broad as long, with large punctures anteriorly. Antennal lamellæ moderately long. Pronotum impunctate except in or near scars and grooves; underside of hind angles with abundant hair. Elytral puncturation strong but not transverse. Mentum impunctate medially. Mesosternal scars narrow and impunctate. Metasternum punctate and hairy anteriorly and laterally; posterior intermediate areas with a few punctures. Whole surface polished. L. 22–26 mm. Brazil. Coll. U.S N.M.: Brazil: Mt. Itatiava, 700 m.; Rio de J., July 27, 1915 (*P. G. Russell*). Coll. H. & D.: Brazil; Sao Paulo State (*H. Luederwaldt*); Parana: Lucena (*Gassner*, ex coll. Horrell); Itatiaya: Maromba, 1100 m. 8. xii. 36 (*J. F. Zikan*) .... *plicatus* Perch., 1835.

44 (43). Central tubercle simple.

45 (46). Parietal tubercles small. Anterior margin of head convex, excised medially; outer tubercles and outer angles obtuse. Central tubercle acute. Frontal area barely twice as broad as long, with numerous large punctures. Frontal ridges present to inner tubercles. Antennal lamellæ moderately long. Pronotum with large group of punctures above scars; undersides of hind angles densely hairy. Lateral puncturation of elytra moderately strong.

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be offered at present. It was concluded that *P. archidonæ* Arrow, 1907, was identical with *curtus*, but in reply to a query Mr. Arrow (*in litt.* 6. vii. 39) writes:—" I have re-examined the unique type of *archidonæ*, which is certainly not *curtus* Kaup. The frontal area is much wider relatively and much more finely and closely rugose. The large punctures of the pronotum are absent, the front margin of the head almost straight or very feebly prominent in the middle. The median process [=central tubercle of Gravely] just reaches the front margin, and secondary [=? outer] tubercles are very sharply prominent. The sides of the metasternum are very thinly hairy." In deference to Mr. Arrow's opinion his species is omitted from synonymy.

P. henrici Rosmini, 1902, L. 18 mm., Ecuador, is hardly distinct from *curtus*. There is a further variant of the *curtus* type in the British Museum from Archidona. A single specimen, immature, L. 25 mm., and having the frontal area smooth and shining and the anterior intermediate areas and lateral areas of the metasternum hairless.

Mentum impunctate medially also indistinct mesosternal scars. Sides of metasternum punctate and hairy; posterior intermediate areas punctate. Abdominal scars deeply impressed. L. 22–25 mm. Brazil. Coll. B.M.: Brazil, Rio Grande (Fry Coll.) .... *aculeatus* Perch., 1835.

46 (45). Parietal tubercles massive. Anterior margin of head straight or faintly excised medially; outer tubercles and angles obtuse. Inner tubercles obsolete. Frontal ridges extending midway to anterior margin. Frontal area strongly punctate. Central tubercle depressed or sulcate above. Antennal lamellæ moderately long. Pronotal angles rounded; posterior with abundant hair below; sides with a few punctures. Shoulders with rather scanty hair-tufts. Elytral puncturation moderately strong. Mentum impunctate medially also indistinct mesosternal scars. Anterior and sides of metasternum punctate and hairy; posterior intermediate areas almost impunctate. L. 25 m. Coll. H. & D.: Brazil: Itatiaya, Macieiras, 21. vii. 33, alt. 1960 m. (*J. F. Zikan*) .... **procerus**, sp. n.

DESCRIPTIONS OF NEW SPECIES.

Passalus rotundatus, sp. n.

Elytra fused, general contours of pronotum and elytra convex. *Antennæ* with three short lamellæ. *Labrum* lightly concave anteriorly. *Head* with anterior margin straight between outer tubercles; central tubercle with long, free apex reaching level of anterior margin, more or less straight, separated behind by shallow grooves from the tuberculiform parietal ridges; frontal ridges meeting central tubercle at about mid-length, distinct behind, obsolete in front; inner tubercles obsolete; frontal area nearly four times as broad as long, strongly punctate; apices of parietal ridges joined by low lateral extensions to supraorbital ridges, behind which is a subcircular depression with mammelate central area; surface except frontal area impunctate. *Pronotum* moderately convex, rather broader than long, sides subparallel, angles rounded; median sulcus strong, incomplete in front; scars with a few large punctures; lateral grooves sparingly punctate; apex of marginal groove a little broadened, incurved, punctate; pronotal surface with scattered micropunctures. *Elytra* soldered, moderately short and convex, a little more than twice as long as pronotum ; shoulders hardly prominent, bare ; puncturation weak throughout, stronger laterally than dorsally ; epipleura bare. *Mentum* with dull scars ; median portion with a few large deep pore-like punctures. *Mesosternum* impunctate ; scars obsolete. *Metasternum* convex ; episterna deeply impressed, narrow, bare, not expanded at either extremity ; anterior intermediate areas and disc impunctate, polished, hairless ; posterior intermediate areas with a triangular group of deeply impressed, large anastomosing punctures. *Abdomen* with impunctate scars. *Tibiæ* of intermediate and posterior legs each with one spine beyond middle.

Length 26·5 mm.

Type unique in Coll. U.S.N.M.

Habitat. Peru, Piches and Perene Vs., 2000–3000 ft. (Soc. Geog. de Lima).

Passalus luederwaldti, sp. n.

Elytra fused, contours rounded. *Antennæ* with three moderately long lamellæ. *Mandibles* normal for the genus. *Labrum* concave anteriorly. *Head* with anterior margin straight between obtuse outer tubercles ; feebly excised medially ; frontal ridges distinct as far as inner tubercles, then more or less obsolete ; frontal area about three times as broad as long, feebly rugose ; anterior angles of head obtuse ; central tubercle large, widely free, extending beyond anterior margin, sulcate behind ; parietal ridges moderately prominent ; a tumid area behind inner tubercles on either side joined by a ridge to supraorbital ridges ; head surface impunctate. *Pronotum* rounded at angles ; sides more or less parallel ; median sulcus strong, incomplete in front ; scars impunctate ; lateral sulcus feebly punctate ; marginal sulcus feebly expanded at apex and punctate ; undersides of posterior angles and sides of pronotum with short hairs. *Elytra* without hair-tufts at shoulders ; all grooves strongly but not transversely punctate, lateral ones more strongly than the dorsal ; epipleuræ hairless. *Legs* with one or more teeth before apex of intermediate tibiæ. *Mentum* impunctate medially except at extreme base. *Mesosternum* with indistinct, hairless scars. *Metasternum* with a few punctures on anterior intermediate areas and a larger group on posterior intermediate areas, otherwise impunctate and hairless; lateral areas narrow, impunctate and hairless. *Abdomen* with narrow, roughened scars, otherwise polished and impunctate. *Length* 31–32 mm.

Type in coll. H. & D., Colombia : Muzo (ex *Staudinger*). *Paratype* in coll. H. & D. ; East Colombia : Villavicencio (ex *Staudinger*).

Passalus procerus (Luederwaldt m.s.), sp. n.

Mandibles typical for the genus. *Labrum* lightly concave at apex. *Antennæ* with three moderately long lamellæ. *Head* straight between outer tubercles, feebly excised medially, sometimes also with a distinct longitudinal median sulcus ; frontal area large, about twice as broad as long, with large punctures anteriorly to a varying degree ; outer tubercles and outer angles of head obtuse ; inner tubercles and anterior half of frontal ridges obsolete : parietal ridges massive ; central tubercle short, rather broad, not extending as far as anterior margin of head, more or less flattened dorsally and sometimes obscurely sulcate. *Pronotum* transverse ; angles rounded ; median sulcus strong, interrupted in front ; scars, lateral and marginal grooves, punctate, the latter a little expanded at apex ; underside of posterior angles and sides with short hairs. *Elytra* not fused, more or less parallel-sided, strongly punctured throughout, almost transversely in striæ 5 and 6 of type, less distinctly in some paratypes, shoulders with scanty hair-tufts. *Mentum* impunctate medially. *Mesosternum* with impunctate, hairless, ill-defined scars. *Metasternum* with punctate and hairy anterior intermediate and lateral areas, the latter are ill-defined ; posterior intermediate areas with at most a few very small punctures ; disc impunctate. *Abdomen* polished, with impunctate scars, those of the last segment large, joining an apical sulcus, isolating a more or less rectangular area in middle of segment. *Legs* without evident teeth above apex on intermediate and posterior tibiæ.

Length 24·5–25·5 mm.

Type in coll. H. & D.

Habitat. Brazil : Itatiaya, Macieiras, 1960 mm., 21. vii. 33 (*J. F. Zikan*). *Paratypes*, three specimens in coll. H. & D., same data as type.

LII.—*New Species of* Proctotrupoidea. By G. E. J. Nixon, B.A., Imperial Institute of Entomology.

Names have been asked for two species of *Telenomus* from the West Indies and three from India. Of these one has been already described by Ashmead, the others are brought forward as new. The Indian species are important as having been bred from the eggs of a butterfly associated with lac.

Since the appearance of my 1937 paper [*] I described further Asiatic *Telenomi* in 1938 [†] which were not fitted into the key given in the earlier paper. I have therefore thought it a good thing to rewrite and revise the key, and to include in it the forms I described in 1938 as well as those whose descriptions appear in the following pages.

There will also be found below a reference to *Telenomus manolus* Nixon.

Subfamily *Telenominæ*.

Key to the Asiatic Species of Telenomus (*females*).

1. Postorbital carina continued as a sharp, more or less completely differentiated margin right across the vertex immediately behind the posterior ocelli; the vertex falling away almost perpendicularly behind this ridge and here usually highly polished; occipital margin absent above, that is, obliterated along its transverse course . . . . 2.

   Postorbital carina not thus continued; the vertex of different conformation, its surface between the anterior ocellus and the more or less well-defined occipital margin varying from nearly flat through curved to feebly angulate . . . . 7.

2. Large species, at least ·9 mm. in length; hind wings wide, the fringe at widest part of wing not more than half the width of the wing there. (Spp. of stout build; medial postscutellar swelling subtriangular, coarsely rugose; legs entirely yellow.) . . . . 3.

   Smaller species, at most ·7 mm. in length; hind wings narrow, its fringe at widest part of wing at least distinctly a little more than half width of wing there . . . 4.

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[*] Nixon, G. E. J., 'Some Asiatic Teleonominæ," 1937, Ann. & Mag. Nat. Hist. (11) vol. xx. pp. 444–475.

[†] Nixon, G. E. J., "Five new Asiatic Teleonominæ," 1938, Ann. & Mag. Nat. Hist. (11) vol. i. pp. 584–593.

3. Vertex between the ocelli more or less smooth, with a few isolated punctures; radicle of the scape about one-third the length of the scape; pedicel + first five segments of flagellum brownish; venation brown, well defined .... [Malaya. *lelus* Nixon (1937):

Vertex between the ocelli with well-marked scaly-reticulation; radicle about one-quarter the length of the scape; pedicel and first 5 segments of the flagellum bright yellow; venation pale yellowish, indistinct .... [Java. *lucullus* Nixon (1937):

4. Sides of the ocellar triangle considerably more than half the base, about 2 : 3; vertex within the ocellar triangle shining, with close, numerous and, for the size of the insect, rather large punctures and with virtually no sculpture between them; tergite 1 noticeably yellowish .. [Malaya. *perplexus* Nixon (1937):

Sides of the ocellar triangle only slightly more than half base, the triangle very narrow transversely; vertex within the triangle differently sculptured; tergite 1 not yellowish .... 5.

5. Legs entirely clear yellow; build narrow; abdomen narrow at base; tergite 1 not strongly transverse nor very short medially. (Sp. with the head large and wide.) .... [Sumatra. *ochus* Nixon (1938):

At least the coxæ darkened; build stout; abdomen broad at base; tergite 1 very strongly transverse, very short medially. (Spp. with the scape, pedicel and first three segments of the flagellum predominantly brownish or blackish; hind wing distinctly widened beyond the nervature; dumpy insects of the form shown in fig. 22.) .... 6.

6. A line joining mid-points of posterior ocelli touches the vertical margin at middle; vertical margin hardly completely differentiated medially, the vertex immediately behind it not falling away perpendicularly; postscutellar medial swelling distinctly sculptured .... [United Provinces. *proditor* Nixon (1937):

A line joining mid-points of posterior ocelli lies behind the vertical margin; vertical margin completely differentiated throughout, the vertex behind it falling away perpendicularly; postscutellar medial swelling showing as a smooth, shining band .... *transversiceps*, sp. n.

7. Species of narrow build, with the abdomen at least about twice as long as wide. (Spp. with the legs entirely yellow.) ... 8.

Species not of narrow build, the abdomen considerably less than twice as long as wide .... 16.

8. Tergites beyond 2 with numerous unusually long hairs; frons, except

the impression, evenly scaly-reticulate, shining. (Sp. with the eyes close together on the vertex, so that when this is seen from above, at right angles to the ocellar triangle, the shortest distance between the eyes is not greater than their width; posterior part of vertex steeply declivous, somewhat characteristically hollowed out; occipital circumference small.).... [Malaya, Siam.
attaci Nixon (1937):

Tergites beyond 2 with only minute hairs, or almost without hairs (except in *pontus* Nixon, where the hairs are rather long); frons in greater part smooth, shining, at most with a few punctures and indication of scaly-reticulation along the eye-margin .... 9.

9. Thorax very short, slightly wider than long; scutellum unusually strongly transverse, its posterior margin virtually straight; postscutellum without a medial swelling, over most of its medial surface flattened and forming part of the posterior *vertical* wall of the thorax; tergite 2 emarginate at apex; tergite 1 virtually smooth all over, its costæ absent or reduced to an almost imperceptible row of minute foveæ at base. (Spp. with the legs entirely yellow.) .... 10.

Thorax less short, at least slightly longer than wide; scutellum not very transverse, its posterior margin rounded; postscutellum with a medial rugose swelling or completely smooth, but in neither case forming part of the posterior *vertical* wall of the thorax; apical margin of tergite 2 straight; tergite 1 strongly and evenly costate except at extreme apical margin, or, if its costæ somewhat reduced, then the postscutellum is flattened and polished .... 11.

10. Abdomen beyond the middle abruptly, *cylindrically* narrowed .... [Malaya.
sorus Nixon (1937):

Abdomen beyond the middle evenly tapering to apex, somewhat flattened... [Philippines, Java.
rowani (Gahan):

11. Postscutellum flattened, polished. (Spp. with the eyes apparently bare at a magnification of × 90.) .... 12.

Postscutellum rugose, or, if somewhat smooth as in *beneficiens* Zehnt., then the eyes very distinctly hairy at × 90 ..... 13.

12. Segment 1 of the middle tarsus hardly twice as long as wide; head, seen from above, not cubical; postorbital margin hardly raised (fig. 1, *f*, 1938) .... [(1938): E. Sumatra.
periparetus Nixon

Segment 1 of the middle tarsus 3–4 times as long as wide; head approaching a subcubical condition (fig. 1, *b*, 1938); postorbital margin strongly raised. (Sp. with the eyes large, very close together on the vertex.) .... [E. Sumatra.
olynthus Nixon (1938):

13. Thorax elongate, very distinctly longer than its greatest width; head approaching a subcubical condition, the eyes close together on the vertex, the shortest distance between them not at all greater than their width as seen from above (figs. 8, *a* & *g*, 1937) .... 14.

Thorax hardly longer than its greatest width; head not approaching a subcubical condition, being rather markedly transverse; shortest distance between the eyes clearly greater than their width as seen from above (figs. 8, *e* & *f*, 1937). 15.

14. Eyes large, their greatest width fully twice as long as the malar space, mesonotum evenly convex; abdomen exactly twice as long as wide, widest at middle; legs somewhat dingy yellow (due to being in alcohol and then dried ?) .... *pontus* Nixon (1937): Solomons.

Eyes small, their greatest width much less than twice the length of the malar space, about 11 : 8; mesonotum somewhat flattened; abdomen short, less than twice as long as wide, widest posterior to middle; legs bright yellow .... *beneficiens* Zehntner: Java.

15. Abdomen hardly twice as long as its greatest width. .... *dignus* Gahan: Philippines, China, Java.

/n Abdomen ~~nearly~~ three times as long as its greatest width .... *dignoides* Nixon (1937): Java.

16. Hind wing much widened beyond nervature, the fringe at widest part being clearly a little less than half the width of the wing there; antennæ slender, flagellum 1 being fully as long as the pedicel; flagellar segments 2 and 3 clearly elongate; vertex with a short, ill-defined groove running inwards from each ocellus. (Sp. with the facies of a *Microphanurus*; antennæ slender, flagellum 4 being intermediate between 3 and 5.) .. *cyrus* Nixon (1937): Java.

Hind wing much less widened, usually more or less parallel-sided beyond the nervature, the fringe at widest part being at least a little more than half the width of the wing there; flagellum 1 always shorter than pedicel; at least flagellum 3 not at all elongate; vertex without such a groove .... 17.

17. Postscutellum with a subtriangular, strongly rugose, medial dilatation; striations of tergites 2 extending over basal third. (Fairly large species, ·85 mm.) .. *triptus* Nixon (1937): Malaya.

Postscutellum without such a rugose dilatation; striations of tergite 2 not, or hardly, extending beyond the basal furrow .... 18.

18. Length about ·7 mm. (Sp. with the hind wing clearly a little widened beyond the nervature; flagellum 5 very strongly

transverse, in length obviously nearer in size to 4 than to 6, the club hence more or less 4-segmented; tergite 1 very strongly transverse, its medial length only about half its lateral length.)...... *manolus* Nixon (1937): [Malaya.
Length at most ·55 mm. .... 19.

19. Legs entirely pale yellow. (Rather slenderly built species, with the antennæ rather long; club sharply 5-segmented, flagellum 5 being much nearer in size to 6 than to 4; scape, pedicel, and first 4 segments of flagellum yellow.) .... *usipetes* Nixon (1938): [Burma.
At least the coxæ and femora darkened .. 20.

20. Head articulated rather low on thorax, so that, in a lateral view of the thorax, the top of the head lies distinctly below the level of the tegulæ. (Dingy species, with the antennæ entirely brown and the legs predominantly brownish; head markedly wider than the thorax, somewhat crescentic as seen from above.) ... *remus* Nixon (1937): [Malaya.
Head articulated in the usual position, so that, in a lateral view of the thorax, the top of the head lies above the level of the tegulæ............ .... 21.

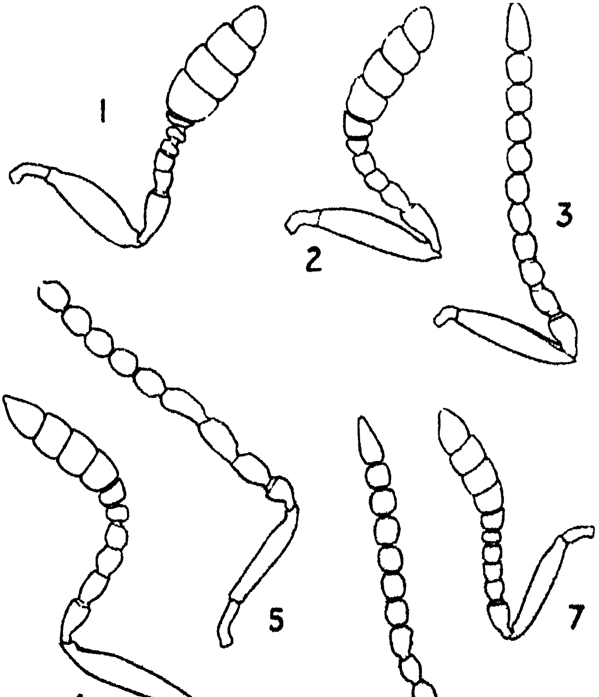
21. Basal foveæ of tergite 1 deep and distinct. (Sp. with the head not obviously wider than the thorax, approaching a subcubical condition.) .... *tirathabæ* Ferrière: [Java.
Basal foveæ of tergite 1 very shallow, indistinct .... 22.

22. Flagellum somewhat yellowish brown; body not very black .... *pegasus*, sp. n.
Flagellum deep brown; body very black.. *otones*, sp. n.

Telenomus crassiclava, sp. n.

♂♀.—Black. Legs entirely deep yellow throughout. Scape of ♀ yellowish on basal half but becoming dark brown towards apex; pedicel and first five segments of the flagellum yellowish; apical four segments blackish. Scape of the ♂ yellow like the legs; pedicel and first three segments of the flagellum paler than the apical seven segments, which are brown. Wings hyaline.

♀.—General form much as in *impressus* Ashm. (*cf.* figs. 20 & 23). *Head* only very slightly wider than the thorax, 25 : 24, not (for the genus) markedly crescentic or transverse, and, seen along a line perpendicular to a line between the posterior ocelli, about one and a half times as wide as its greatest length, not at all flattened above. Frons, in a dorsal view of the head, more evenly and noticeably convex than in *impressus* (*cf.* fig. 20). Shortest distance between the eyes (on the vertex) equal to their width when the head is seen from above. Frons right down to the genal sulcus completely smooth. Vertex shining, with some weak scaly-reticulation, amongst which there are a few very indistinct punctures, evenly rounded between the anterior ocellus and the occipital margin. Antennæ: pedicel about as long as the following three segments together; flagellum 5 very short, very strongly transverse, saucer-shaped; if size alone is taken into account the club is 4-segmented, but if width, then virtually 5-segmented; it is unusually thick (fig. 1).



Antenna of: 1. *Telenomus crassiclava*, sp. n., ♀; 2. *T. impressus* Ashmead, ♀; 3. *T. impressus* Ashmead, ♂; 4. *T. transversiceps*, sp. n., ♀; 5. *T. transversiceps*, sp. n., ♂; 5. *T. transversiceps*, sp. n., ♂; 6. *T. pegasus*, sp. n., ♂; 7. *T. pegasus*, sp. n., ♀.

Thorax: mesonotum over most of its surface smooth and shining, especially on posterior half, except for minute setiferous punctures; around the anterior margin there is the merest indication of the usual scaly-reticulation (×90). Scutellum hardly convex, smooth, shining. Postscutellum with a medial, coarsely rugose swelling. Mesopleura antero-ventrally completely smooth. Hind wing not parallel-sided beyond the nervature; fringe at widest part of the wing shorter than the width of the wing there, about 9 : 10.

Abdomen in shape much like that of *impressus* Ashm. (*cf.* fig. 20), but the apical segments are somewhat contracted in dried specimens. Tergite 1 with strong costæ nearly to apex. Tergite 2 at base with short striæ which are not longer than the middle length of tergite 1. Tergites 3–6 smooth, impunctate.

♂.—Antennæ hardly distinguishable from those of *impressus* Ashm.; compared with that species the radicle is longer and the pedicel is slightly longer and stouter in proportion to flagellum 1; the hairs of the flagellum are finer, there being fewer of the thickened differentiated ones. Genitalia (fig. 18).

Length: ♂♀, ca. 7 mm.

W. INDIES: Santa Lucia, 14 ♀♀ (one the type), 1 ♂, bred 11. xii. 1938, in company with *Telenomus impressus* Ashm. from at least one species of *Ormenis* (probably *O. pygmæa*) (*R. G. Fennah*). The host is a ubiquitous minor pest in St. Lucia, occurring on some ornamental plants.

This does not appear to be any of the species described by Ashmead from St. Vincent, the types of most of which are in the British Museum. The species is largely characterized in both sexes by the smooth strongly shining mesonotum, and in the female especially by the thick club and very short fifth flagellar segment.

Telenomus impressus Ashmead.

Telenomus impressus Ashm., 1894, J. Linn. Soc. xxv. p. 204.
Liophanurus impressus Ashm., 1926, Kieffer in 'Das Tierreich,' Lief. 48, p. 78.

Ashmead described this species from one male and six females. In the British Museum there are only two specimens, a male and a female, both labelled "*impressus*" in Ashmead's writing. My conclusion that they belonged to the same species as the bred series I had before me was confirmed by a comparison of the genitalia of the males.

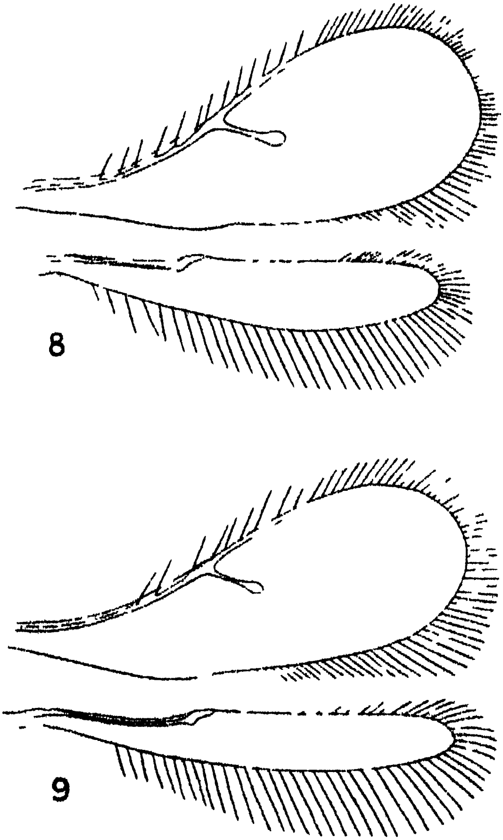
As Ashmead's description is inadequate to make identification of the species possible I give a redescription of it below.

♂♀.—Black. Legs entirely deep yellow. Scape same colour as legs; flagellum brown in both sexes, the underside of the club segments in the female noticeably yellowish; this is not a feature of all specimens. Venation pale, by no means sharply defined.

♀ (figs. 20 & 23).—*Head* not (for the genus) strongly transverse, and not at all crescentic as seen from above; seen along a line perpendicular to a line between the posterior ocelli one and a half times as wide as its greatest length (fig. 20). Shortest distance between the eyes, when the head is viewed as just mentioned, to their width as 8 : 7. Frons virtually smooth and shining; above and towards the eye-margin there is a faint trace of scaly-reticulation visible at × 90, with a few widely separated, rather sharp punctures; between the antennal insertions and lower margin of the eye there is an indication of similar sculpture. Vertex in a lateral view of the head somewhat flattened and with hardly a trace of a posterior declivity (fig. 23); sculpture of vertex consisting of faint, broken scaly-reticulation with a slight transverse tendency; a few scattered punctures are also present; similar sculpture occurs on the head behind the eyes. Antennæ: pedicel twice as long as flagellum 1; flagellum 5 nearer in width to 6 than to 4, so that the club is 5-segmented (fig. 2).

Thorax: Mesonotum distinctly a little flattened above, with feeble, rather wide meshed scaly-reticulation which has a longitudinal and slightly convergent tendency on about posterior half; sparse punctures are present. Scutellum completely smooth. Postscutellum with a transverse rugose medial swelling. Antero-ventral part of the mesopleura with feeble scaly-reticulation; this sculpture limited above by a nearly transverse crenate groove. Stigmalis of fore wing only of moderate length; hind wing slightly widened beyond the nervature; fringe at widest part of wing equal to width of wing at the same place. *Abdomen* appearing a little shorter than in fig. 20 owing to retraction of segments. Tergite 1 with strong costæ nearly to apex. Striations of tergite 2 covering an area not longer than medial length of tergite 1. Apical segments completely smooth.

♂.—Antennæ: flagellum 1–3 only very slightly longer than wide; 5–9 moniliform (fig. 3). Genitalia very distinctive; especially characteristic is the great length of the sheath-like part of the structure; its limits are indicated by the cross-hatched margin shown in the figure (fig. 19).



Wings of: 8. *Telenomus otones*, sp. n., ♀; 9. *T. pegasus*, sp. n., ♀.

Length: ♂♀, ·7 mm.

W. Indies : Santa Lucia, 7 ♀♀, 3 ♂♂, bred, 11. xii. 1938, in company with *T. crassiclava* sp. n., from at least one species of *Ormenis* (probably *O. pygmæa*). The host is a ubiquitous minor pest in St. Lucia, occurring on some ornamental plants. The type of *T. impressus* Ashmead is from St. Vincent.

This species seems to be characterized by the shape of the head, which renders the facies somewhat distinctive, especially in profile, and by the sculpture of the mesonotum. This sculpture is not essentially different from that which occurs in most species of *Telenomus*, but what is characteristic about it in *impressus* is the comparatively large size of the meshes and their tendency to be elongate in the longitudinal direction of the thorax.

Telenomus transversiceps, sp. n.

♂♀.—Black. Radicle of the antenna yellow ; scape blackish, yellowish at base ; flagellum dark brown, the first five segments slightly paler in the female. Legs of the female dingy yellowish, with the femora darker than the tibiæ and all the coxæ blackened ; the single male has the legs more clearly yellowish than the female, with only the front femora slightly darkened and all the coxæ less blackened.

♀.—*Head* very strongly transverse, much wider than the thorax, 21 : 16, and, seen from above along a line perpendicular to a line between the posterior ocelli, fully three times as wide as its medial length ; when the head is seen from above, so that the antennal prominence is wholly in view, the frons shows a distinct bulge on each side between the lowest point of the eye and the antennal insertions. Postorbital carina continued as a sharp, completely differentiated margin right across the vertex. Eyes occupying entire lateral surface of the head when this is seen from above, with sparse, extremely short hairs which are hardly visible at ×90 ; in one female I can see no hairs at all. No occipital carina present, the surface of the head posterior to the ridge of the vertex completely smooth and somewhat concave, and, behind the eyes, cut away at more than a right angle. Frons completely smooth, shining except for a narrow band of scaly-reticulation joining the lowest point of the eye with the antennal insertion. Vertex anterior to the ridge

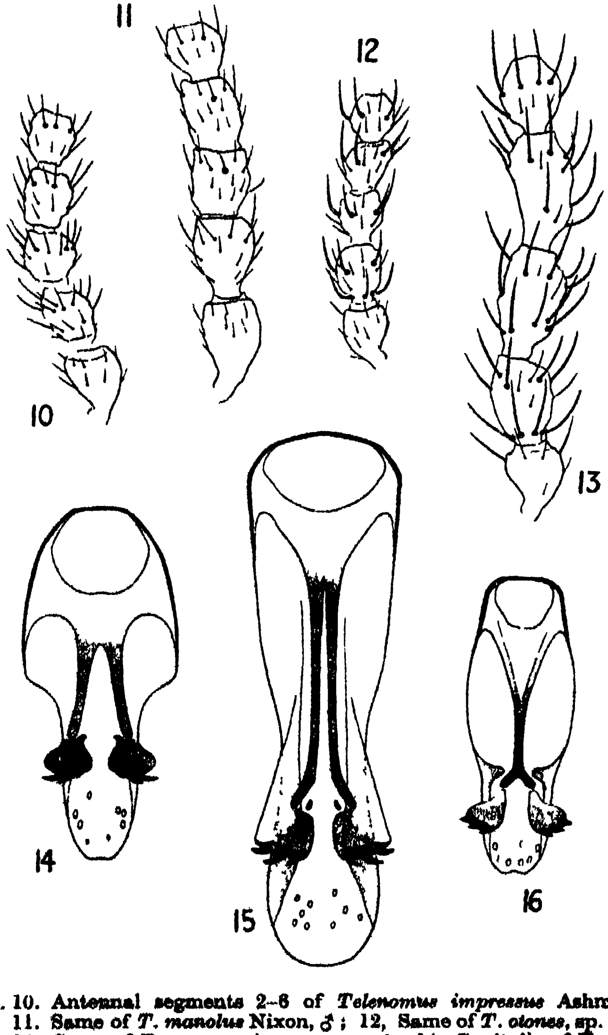


Fig. 10. Antennal segments 2–6 of *Telenomus impressus* Ashm., ♂ ; 11. Same of *T. manolus* Nixon, ♂ ; 12, Same of *T. otones*, sp. n., ♂ ; 13. Same of *T. transversiceps*, sp. n., ♂ ; 14. Genitalia of *T. otones*, sp. n., ♂ ; 15. Same of *T. transversiceps*, sp. n., ♂ ; 16. Same of *T. pegasus*, sp. n., ♂. (Genitalia drawn to same scale as figs. 17–19.)

with fine scaly-reticulation and with a single puncture on each side about midway between anterior and posterior ocellus. Antennæ: radicle long, more than one-third the length of the scape; flagellum 1 about two-thirds the length of the pedicel; flagellum 5 more or less intermediate in width between 4 and 6, so that the club is hardly differentiated (fig. 4).

Thorax: Mesonotum strongly convex, feebly shining, covered closely with tiny raised points, the surface between which shows faint scratches. Scutellum completely smooth. Postscutellum medially flattened, polished, unsculptured except for the feebly foveolate posterior margin. Hind wing clearly widened at middle, its fringe at widest part four-fifths of the wing-width at same place.

Abdomen only very slightly longer than wide, rather strongly narrowed to base. Tergite 1 about twice as wide basally as long medially, evenly costate to apex; 2 with very short striations at extreme base.

♂.—Flagellum 1 slightly longer than pedicel; flagellum 1–3 very distinctly elongate; 5–9 slightly longer than wide (fig. 5). Genitalia very distinctive (fig. 15), the ventral struts appear to be separated for nearly their whole length; that part of the ventral plate posterior to struts is much more heavily pigmented than are the struts themselves, though the figure shows this area white; the apical appendages are similarly strongly pigmented; the basal portion (? cardo), not shown in figure, is one-third the length of the ædeagus itself.

Length: ♂♀, about 5·6 mm.

INDIA: Namkum, Ranchi, 1 ♂, 3 ♀♀ (one ♀ the type), bred 24. i. 1938, from eggs of the Lycænid butterfly, *Tarucus theophrastus* L. on lac hosts (Indian Lac Research Institute).

Telenomus pegasus, sp. n.

♀.—Black. Radicle of the antenna more or less yellowish; the extreme base of the scape, the pedicel and first five segments of the flagellum slightly paler than the apical flagellar segments; the entire antenna is obscure in colour. Wings with a slight yellowish tint.

Head distinctly but only a little wider than the thorax, 13 : 11, and, seen along a line perpendicular to a line between the posterior ocelli, not quite twice as wide as its greatest length (fig. 21). Shortest distance between the eyes on the frons, seen from above, nearly one and a half times as great as the width of the eye, 7 : 5. Frons virtually smooth all over; against the eye-margin above the merest trace of reticulation and one or two minute punctures; between the antennal insertions and the base of the eye there is some weak scaly-reticulation. Vertex more or less evenly rounded between the anterior ocellus and the occipital margin, shining and with only weak, broken scaly-reticulation, in which are present a few small indistinct punctures. Head behind the eyes cut away fairly sharply (fig. 21). Antennæ: radicle rather long; pedicel much longer than flagellum 1; f. 1 and f. 2 not longer than wide; club sub-five-segmented (fig. 7).

Thorax: Mesonotum weakly shining, its sculpture not resolvable at × 90, though the usual elements of scaly-reticulation and feeble punctures are indicated. Scutellum smooth except for a few small punctures, which seem to be more or less crowded along the anterior margin. Medial rugose swelling of the postscutellum somewhat flattened and shining when the insect is viewed from behind. Wings (fig. 9).

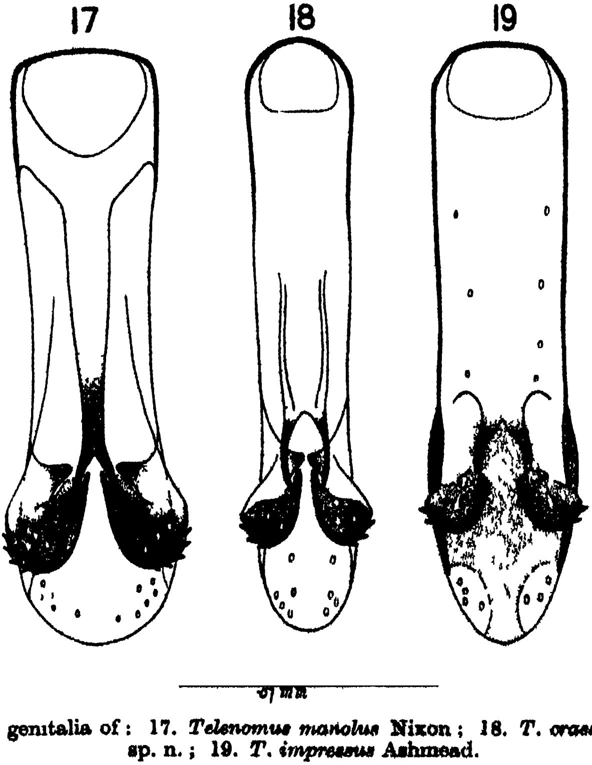
Abdomen rather strongly narrowed to base. Tergite 1 very strongly transverse and very short medially, its costæ hence so short as to form merely a row of oblong foveæ; 2 feebly costate at extreme base; in fig. 21 the shape of the abdomen beyond tergite 2 has been somewhat generalized because in dried specimens the apical tergites are always retracted.

♂.—Legs paler than in the female; antennæ pale, obscure yellowish, darkened only on apical 5–6 segments; flagellum slightly more hairy than in the next species (*cf.* fig. 12), the thickened seta-like hairs less differentiated. Genitalia very distinctive (fig. 16), on account of being widened medially and having the "ventral plate" greatly narrowed in apical half, so that the struts, which normally form the lateral margin of the plate, in this case have become so approximated as to be fused; the basal portion (cardo ?), not shown in figure, longer than broad and fully half as long as the rest of the genitalia.

Length: ♂♀, ca. 4·8 mm.

India : Namkum, Ranchi 8 ♀♀ (one the type), 9 ♂♂, bred 24. i. 1938, from eggs of the Lycænid butterfly *Tarucus theophrastus* L. on lac hosts in company with *Telenomus transversiceps*, sp. n., and the following species (Indian Lac Research Institute).

There is nothing at all characteristic about the external appearance of this *Telenomus*. It is extremely like the



Male genitalia of : 17. *Telenomus manolus* Nixon ; 18. *T. crassiclava*, sp. n. ; 19. *T. impressus* Ashmead.

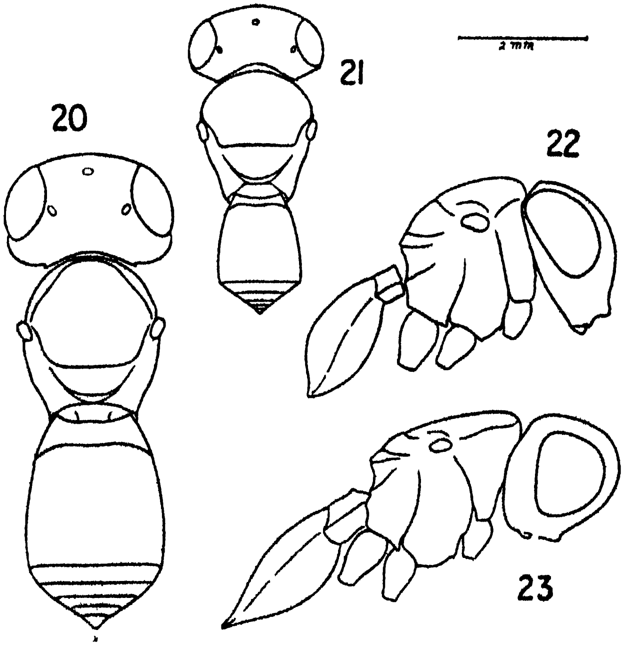
following species, in the description of which it will be further discussed.

Telenomus otones, sp. n.

As already pointed out this insect closely resembles *pegasus*, sp. n., in general appearance. It is the genitalia of the males, however, which show them to be widely different species. The differences shown by this structure are of such a magnitude as to suggest that the apparent close affinity of the two species may be only superficial. Although I have already examined the genitalia of a good many species of *Telenomus* I have not yet been able to get a clear idea as to how far their form is a guide to specific relationships. I think many more species will have to be examined before conclusions on this subject can be reached.

T. otones differs from *pegasus* as follows :—

♀.—Antennæ darker; radicle of the scape slightly shorter. Head slightly more transverse and slightly wider in proportion to the width of the thorax. Mesonotum rather more shining, not so clearly convex as in *pegasus*. Wings more hyaline in tint, the fore wing distinctly broader at apex and more bluntly rounded



Body of: 20. *Telenomus impressus* Ashmead, ♀; 21. *T. pegasus*, sp. n., ♀; 22. *T. transversiceps*, sp. n., ♀ (lateral); 23. *T. impressus* Ashmead, ♀ (lateral).

here; hind wing clearly widened between nervature and apex (fig. 8).

♂.—Scape and radicle darker than in male of *pegasus*, but structurally the antenna hardly different; arrangement of hairs as in fig. 12. Tergite 1 slightly less transverse and slightly longer medially. Genitalia remarkable in that the "ventral plate" is extremely deeply excised, so that the lateral struts project as two free arms (fig. 14); cardo (not shown in figure) short, transverse, hardly more than one-fifth of the rest of the structure.

INDIA: Namkum, Ranchi, 5 ♀♀, one the type, 1 ♂, bred 24. i. 1938, in company with the two preceding species from eggs of the Lycænid butterfly, *Tarucus theophrastus* L. on lac hosts (Indian Lac Research Institute).

Telenomus manolus Nixon.

Telenomus manolus Nixon, 1937, Ann. & Mag. Nat. Hist. (10) vol. xx p. 454.

Originally recorded from Malaya, Kuala Lumpur, where it was bred from lepidopterous eggs on coffee. I have now seen a series from E. SUMATRA: Asahan, 50–60 mm., 1934–36, both sexes bred from eggs of some pest of *Uncaria gambir* Roxb. (*F. Schneider*).

In referring to the male genitalia, in my earlier paper, I expressed a doubt concerning the tooth-like thickening which occurs on each of the apical articulated appendages behind the posterior tooth. I mentioned that it appeared to be free, although I did not show it free in the figure, believing it to be homologous with a similar sclerotization seen in other species of *Telenomus*. On re-examining the preparation from which the drawing was made, and in which the balsam has now become darkened, I find that the thickened process in question is not free. The original figure, p. 457 *l. c.*, shows the "ventral plate" rather too much widened to base and the sides of the basal cylinder slightly too much curved outwardly. Fig. 17 has been drawn from a male belonging to the series I now record from Sumatra, and, embodying the corrections of the mistakes in the earlier figure, gives a more faithful representation of the genitalia of the species.

LIII.—*Notes on the Mallophaga of Aquatic Birds.*—I. *Mallophaga from Divers* (*Gaviiformes*). By GORDON B. THOMPSON.

THE divers consist of a very small homogeneous group of birds (four species and four subspecies) which are placed between the penguins (Sphenisciformes) and the grebes (Colymbiformes) in the classification of the birds. I understand, however, that the modern view is that they (the divers) have no near relations. They are a primitive group, and although they come near to some other aquatic groups at the base of the avian tree the gaps between them are wider than is the case with groups higher up. It seems that only three species of Mallophaga have been named from them. Having before me specimens from *Gavia a. arctica* (L.) and *Gavia immer* (Brünnich), I have endeavoured to analyze the validity of the three species of parasites known, and am presenting my conclusions below.

The following are the three species of Mallophaga which have been described from divers :—

(1) *Docophorus colymbinus* Denny, 1842.

Type-host [*]. — *Gavia stellata* Pontoppidan). Red-throated Diver.

(2) *Nirmus frontata* Nitzsch in Giebel, 1866.

Type-hosts.—*Gavia arctica arctica* (Linn.). Black-throated Diver. *Gavia stellata* (Pontoppidan).

(3) *Docophorus graviceps* [†] Kellogg, 1896.

Type-host [‡].—*Gavia arctica pacifica* (Lawrence).

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[*] Fixed by me in my paper on the Denny Coll. (Thompson, 1937, p. 77).

[†] Owing to the fact that this parasite had not then been regarded as a true parasite of a diver it was omitted from the second part of my type-host list (see Ann. & Mag. Nat. Hist. 1939, ser. 11, vol. iii. p. 242). It was originally described from specimens collected from *Fulica a. americana* Gmelin and *Gavia a. pacifica* (Lawrence). It should be added as no. 62 *a*, thus :—*Gavia arctica pacifica* Lawrence—*Philopterus graviceps* (Kellogg), 1896. On *Urinator pacificus* from California.

[‡] See below under "Synonymy of recorded Hosts."

HISTORY OF THE SPECIES.

The first mention * of a parasite from divers was in 1842, when Denny described and figured a species which he called *colymbinus*. A whole figure of a female and a detail of the antenna was given. Denny's specimens were obtained from *Colymbinus septentrionalis* (Red-throated Diver), *C. arcticus* (Black-throated Diver), and *C. glacialis* (Northern Diver). With regard to the specimens from the latter host, Denny considered them to be a variety, but remarked that specimens from the Red-throated Diver were "quite as bright." All that remains of this author's specimens are four females labelled as from "*Colymbinus* sp."

In 1861 the German worker Nitzsch mentioned a parasite "*Nirmus frontatus*" as a *nom. nud.*, the host being *Eudytes arcticus*. Later, in 1866, Giebel briefly described Nitzsch's specimens under the name "*frontatus*," and gave the hosts as *Eudyptes arcticus* and *E. septentrionalis*. He particularly mentioned the "half-moon shaped signature" (*cf.* figure in Giebel's 'Insecta Epizoa'). In 1874 Giebel redescribed and figured † a female of the species, and gave the hosts as "*Colymbus arcticus* and *C. septentrionalis*." He stated that Nitzsch obtained it in large numbers on a fresh corpse. Giebel also referred to Denny's species, and quoted the latter's Latin diagnosis, but he misspelt the name thus—"*columbinus*."

The next mention of a diver parasite is to be found in Piaget's Monograph. In 1880 Piaget described and figured females obtained from *C. septentrionalis* which he regarded as being the same as Denny's *colymbinus*. There are two females preserved in Piaget's collection. On a later page this author gave a French interpretation of Giebel's description of "*frontatus*," but he did not have specimens which he regarded as being this species.

Osborn (1896) recorded specimens off *Urinator lumme*, presumably from N. America, as *D. colymbinus* Denny.

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* According to Dr. S. Kéler, Nitzsch collected, described, and figured *N. frontatus* in 1826, but this was not published (MSS. Bd. iv. S. 257 u. 317).

† The trabeculæ are absent in the figure given by Giebel, but he says this is a mistake.

In the same year Kellogg described a species which he called "*graviceps*" on the basis of specimens obtained from *Fulica americana* and *Urinator pacifica* from California. It is evident now that the diver was the true host of Kellogg's specimens and that those on the coot were stragglers. The same author, in 1899, recorded specimens from *Urinator pacifica* as *D. colymbinus* Denny, and also listed his *D. graviceps* as occurring on the same host. It appears therefore that he regarded the two species as distinct. For the list of the Mallophaga of the world (1908) Kellogg listed all three named species from divers.

Mjöberg (1910) recorded Denny's "*colymbinus*" from *Colymbus arcticus* and *C. septentrionalis.* Evans (1912) recorded Denny's species from the same two hosts and a single specimen from a goosander which must have been a straggler.

Harrison (1916) listed Denny's and Kellogg's species under *Philopterus* and Nitzsch's species under *Degeeriella* in his list of the Mallophaga.

Apart from three records, one for each of the named species, by Kistiakowsky, Bird, Peters, and Gross (see Bibliography for refs.), the diver parasites appear not to have been mentioned otherwise.

SYNONYMY OF RECORDED HOSTS.

Colymbus septentrionalis = *Gavia stellata* (Pontoppidan).
C. arcticus = *G. a. arctica* (Linn.).
C. glacialis = *G. i. immer* (Brunnich).
Eudytes arcticus = *G. a. arctica* (Linn.).
E. septentrionalis = *G. stellata* (Pontoppidan).
Urinator lumme = *G. stellata* (Pontoppidan).
U. pacifica = *G. arctica pacifica* (Lawrence).

*Conclusions as to Synonymy**.

I have had my specimens from *Gavia a. arctica* L. compared with the types of Nitzsch's *frontatus* and Denny's *colymbinus* and Piaget's specimens of *colymbinus* Denny, and it seems that they are all identical. Denny's name, being the oldest, will stand. I have also specimens determined as *graviceps* Kellogg which seem to represent the same species.

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* I am indebted to Dr. S. Kéler and Miss T. Clay for their help.

A complete bibliography of the species follows :—

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Degeeriella frontata (Nitzsch), Bird, 1935, Ibis, p. 847.
P. graviceps (Kellogg), Peters, 1936, 'Bird Banding,' vii. p. 10.
P. colymbinus (Denny), Gross, 1937, 'Auk,' liv. p. 41.

Supplementary Note.

When this paper was ready to send to the press I received a copy of Dr. S. Kéler's paper (1939, Z. Parasitenk. Bd. 11, p. 49) in which he has erected a new genus for the reception of the diver parasite which I am considering here. I have therefore substituted Kéler's generic name for the one which I was proposing.

CRASPEDONIRMUS Kéler (1939).

Fairly robust forms of moderate size, well pigmented and sclerotized.

Head slightly shorter than long, with lateral margins almost straight, temples broadly rounded, posterior margin almost straight. Main feature of the head is its division into two parts by a dorsal line running transversely just posterior to the base of the antennæ. Clypeus distinct, goblet-shaped, but there is no clypeal suture. Antennal bands and mandibles strong. Antennæ small, simple. Trabeculæ small.

Prothorax small; meso-metathorax larger, but neither as wide as the head at its widest point.

Abdomen slightly more than one and a half times as long as broad; fourth segment broadest. Transverse bands continuous. Pleurites strongly pigmented and sclerotized, overlapping. Tergites separated from the pleurites by a narrow clear area, almost rectangular, continuous except on first segment. Terminal segments of female bilobed; genital plate distinctive (see fig. 6). A spermatheca is present. Male genitalia small, parameres terminating in a "claw."

Parasitic on Gaviiformes.

Distinguished from the known genera * by the division of the head together with the numerous other distinctive characters of the species.

Genotype.—*Nirmus frontatus* Nitzsch in Giebel=*Docophorus colymbinus* Denny.

Type-host.—*Gavia stellata* (Pontoppidan).

Description † *of* Craspedonirmus colymbinus (Denny).

Specimens examined.—1 ♂ and 3 ♀♀ off the type-host, British Isles; 11 ♀♀, 1 ♂ off *Gavia a. arctica* Linn. from Orkney Is.; and 1 ♀, 1 ♂ off a diver collected in N. American waters.

Female.

Length, 2·15 mm.; *greatest breadth*, 0·77 mm.

Head: almost as long as broad, with anterior margin straight and the lateral margins straight except for a slight bulge just anterior to the antennæ. Posterior margin slightly convex. Clypeal suture not distinct.

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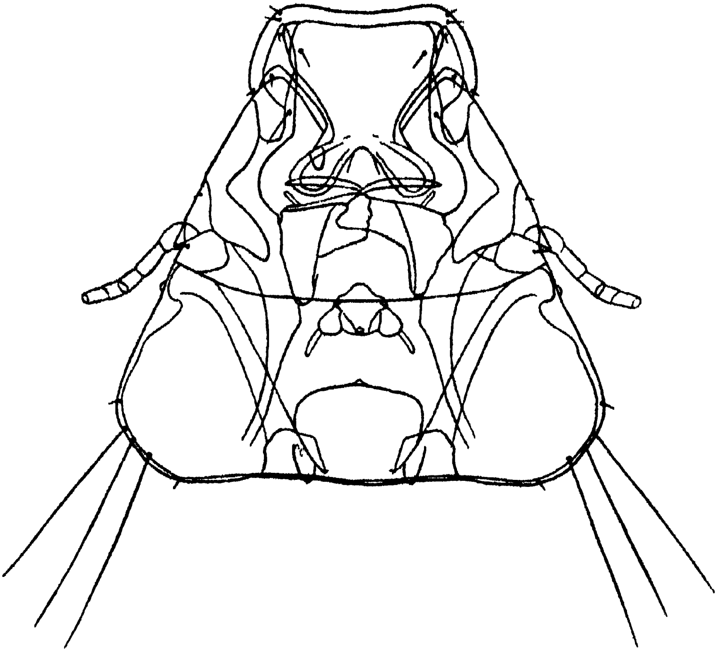
* Dr. Kéler says that this genus reminds one somewhat of *Rallicola*.

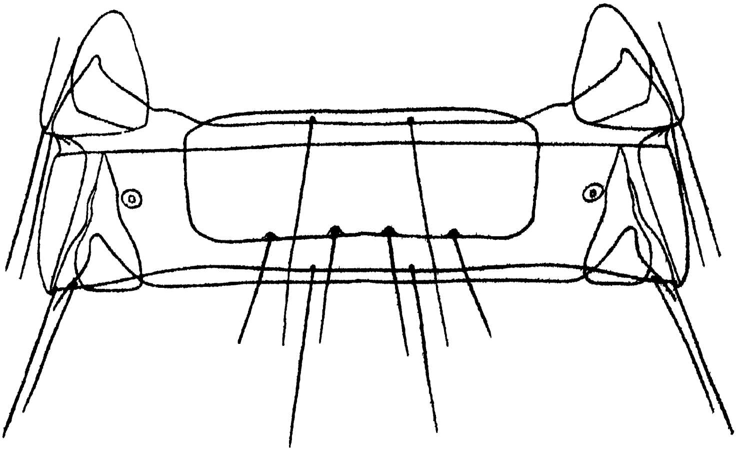
† It should be noted that, owing to the condition of some of the specimens, the whole of this description is based on specimens collected from *Gavia a. arctica* Linn.

Fig. 1.



Head of *Craspedonirmus colymbinus* (Denny), ♂.

Fig. 2.

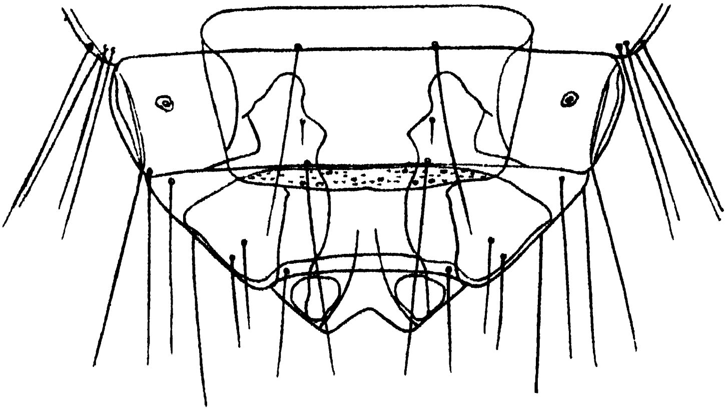


Fourth abdominal segment of *Craspedonirmus colymbinus* (Denny), ♀.

Antennal bands and mandibles strong. The head is divided into two by a dorsal line running transversely from the posterior point of attachment of the antennæ and curving slightly medianly. Temples evenly rounded. Trabeculæ small, about as long as the first segment of the antennæ. Antennæ small, five-segmented, first two segments almost equal in length and together are equal in length to the remaining three segments. For other details of the head see fig. 1.

Thorax small. Prothorax narrower than the head at the temples in the proportion of 5 : 9 ; almost rectangular ; less than half as long as wide ; lateral margins heavily sclerotized and pigmented, also two bars running inwards but not meeting medianly posterior to the first coxæ ; apparently devoid of setæ. Meso-metathorax rather wider than prothorax ; wider than long (7 : 3) ; wide lateral margins well sclerotized and pigmented ; posterior margin produced backward to a blunt point. One fairly long seta at about the middle of the lateral margin and one fairly long and a shorter seta in the posterior lateral angles. Legs short and stout.

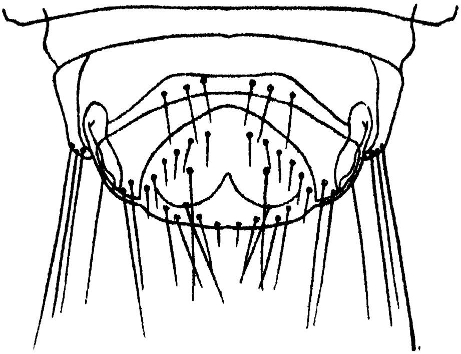
Fig. 3.



Terminal abdominal segments of *Craspedonirmus colymbinus* (Denny), ♀

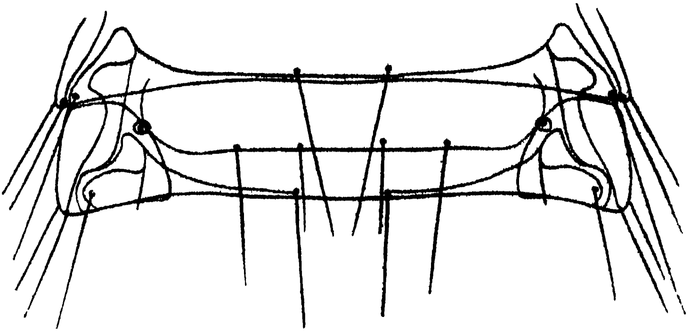
Abdomen: a little more than one and a half times as long as broad. First segment narrow segments becoming broader to the fourth, then decreasing again. Transverse bands continuous. Pleurites strongly pigmented and

Fig. 4.



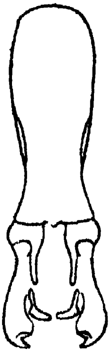
Terminal abdominal segments of *Craspedonirmus colymbinus* (Denny), ♂.

Fig. 5.



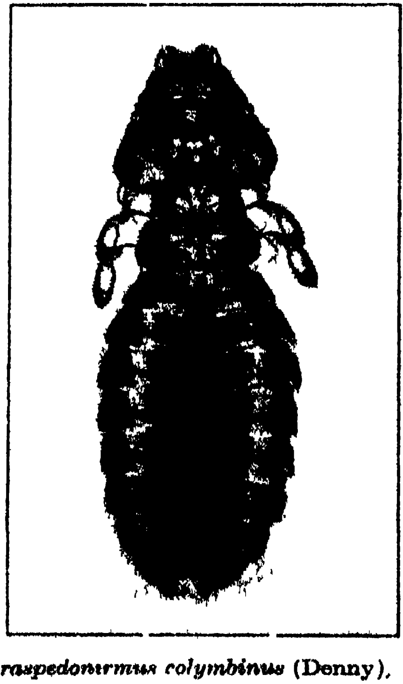
Fourth abdominal segment of *Craspedonirmus colymbinus* (Denny), ♂.

Fig 6



♂ genitalia of *Craspedonirmus colymbinus* (Denny).

Fig 7



Craspedonirmus colymbinus (Denny), ♀.

sclerotized, overlapping. Tergites separated from pleurites by a narrow clear area, almost rectangular, each bearing two fairly long setæ medianly on the posterior margin. Sternites smaller, each bearing four fairly long setæ medianly on the posterior margin. Spiracles clearly visible. Terminal segments (see fig. 3). A spermatheca is present.

Male.

Length, 1·96 mm; *greatest breadth*, 0·60 mm.

Smaller, but in all other respects closely resembling the female. For details of the terminal abdominal segments, the abdominal segments, and the genitalia see figs. 4, 5, and 6.

N.B.—It is probable that further research on the Mallophaga of the divers may show that there is more than one species involved. At present, however, it seems that the specimens from the two hosts which I have before me are identical, although I must confess that of the three males I have examined only one is in good condition. The photograph (fig. 7) and figures 1, 2, 3, and 6 were prepared from specimens off *Gavia a. arctica* (Linn.), and figures 4 and 5 were prepared from specimens off *Gavia i. immer* (Brünnich).

LIV.—*Two new Orthoptera from Turkey.* By B. P. Uvarov, D.Sc., British Museum (Natural History).

The types of the following new species are deposited in the British Museum (Natural History), and paratypes in the Institute of Zoology, Ankara, Turkey.

Tettigoniidæ.

Isophya karabaghi, sp. n. (Fig. 1.)

Differs from all known species by the unusually long ovipositor, while the male is recognizable by the shape of the subgenital plate.

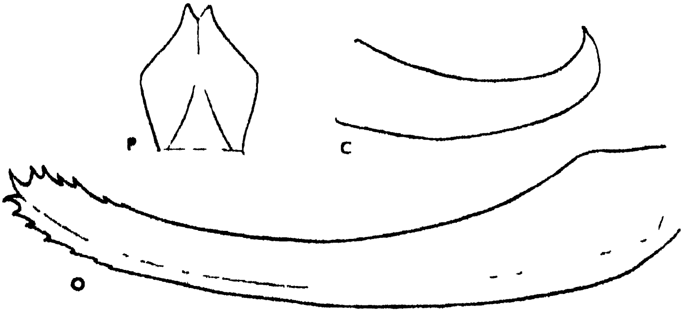
♂ (*type*).—Fastigium of vertex narrow, parallel-sided, with rounded apex, sulcate above.

Pronotum moderately saddle-shaped, short; front margin rounded-truncate; hind margin quite straight, not raised; lateral lobe longer than deep, with the lower margin practically straight and the hind angle very obtuse.

Elytra longer than pronotum, strongly ampliate; inner margin rounded-obtuse angular.

Supra-anal plate more than twice as broad as long; posterior margin shallowly concave; posterior angles broadly rounded. Cercus (fig. 1, *c*) stout, sparsely hirsute, incurved, with a short apical spinule. Subgenital plate (fig. 1, P) large, elongate, apically narrowed and triangularly excised, with an incomplete median carinula.

Fig 1



Isophya karabaghi, sp. n.

P, male subgenital plate. *C*, male cercus from above; *O*, female ovipositor.

Coloration yellowish green, with small reddish-brown dots; legs pale reddish brown; elytra with the costal margin whitish.

♀ (*paratype*).—Elytra very short, strongly transverse, not touching each other on the bases. Subgenital plate rounded-triangular, nearly twice as broad as long. Ovipositor (fig. 1, O) nearly four times the length of pronotum, weakly recurved, strongly dentate at the apex.

Length of body, ♂ 18, ♀ 20; pronotum, ♂ 3·5, ♀ 4; elytra, ♂ 5, ♀ 1·5; hind femur, ♂ 15, ♀ 16; ovipositor, ♀ 15 mm.

Described from 2 ♂♂ (including the type) and 3 ♀♀ taken in the vicinity of the Institute of Zoology, Ankara, 14. v.–9. vi. 1939, and 1 ♂ at Haymana, 26. v. 1939, by Mr. Tewfik Karabagh, in whose honour the species is named.

Acrididæ.

Nocarodes bodenheimeri, sp. n. (Fig. 2.)

A relatively small species, allied to *N. znokoi* Miram, but differing in larger size, sulcate median pronotal carina, more obtuse fastigium of vertex, and the coloration of hind legs.

♂ (*type*).—Antennæ 12-segmented, shorter than head and pronotum together, stout, somewhat flattened in the basal position.

Frontal ridge sulcate throughout, gradually widened from fastigium down to the ocellum, parallel-sided for a short distance below the ocellum, then widened more strongly towards the clypeal suture; viewed in profile it is weakly convex, not excised at the level of the ocellum. Fastigium of vertex (fig. 2, F) nearly sloping, forming a broadly rounded angle with the frontal ridge; viewed from above it is distinctly transverse, with straight antero-lateral margins; surface excavate, coarsely granose, with a short and irregular median sulcus in the anterior portion, and a strongly raised, medially sulcate, median carina in the posterior portion; this carina continues throughout the occiput, the surface of which is divided into two series of fairly regular cells adjoining the carina.

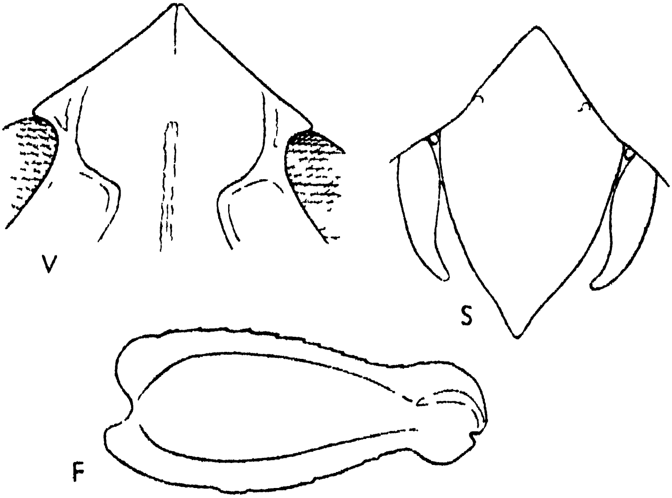
Pronotum short and broad, densely granulose. Anterior margin obtusely angular in the middle, with the sides broadly concave; posterior margin weakly bisinuate. Median carina strongly developed, distinctly sulcate throughout. Lateral carinæ in prozona straight, practically parallel; in metazona much more widely distant, regularly excurved. Transverse sulci obsolete on the disc, and only one present on the lateral lobe.

Prosternum with the anterior margin laminate, bearing an acute median projection, flanked by two shorter and broader projections.

Mesonotum, metanotum, and abdominal tergites on the dorsum granulose. Median carina low, but distinct throughout the dorsum, sulcate on the metanotum only. Lateral carinæ very weak and irregular, more clearly visible only on the metanotum and the first tergite.

Last tergite (fig. 2, S) deeply angularly excised. Supra-anal plate elongate, rounded triangular, with somewhat attenuate apex ; it has a scarcely perceptible transverse sulcus close to the base and a pair of low and irregular tubercles at the lateral ends of that sulcus. Cercus shorter than the plate, distinctly incurved. Subgenital plate laterally compressed, recurved.

Fig. 2.



Nocarodes bodenheimeri, sp. n ♂.
V, vortex ; *S*, supra-anal plate and cerci ;
F, hind femur.

Hind femur short and broad ; upper carina irregularly denticulate ; lower carina convex in profile, with the edge irregularly crenate. Hind tibia with 9 inner and 10 outer spines.

General coloration dark grey, with blackish and creamy pattern. Lateral pronotal lobes with some round black tubercles, particularly along the anterior margin, and blackish, but not shiny, patches under the carinæ. Abdomen mostly blackish, the posterior portion of the dorsum being lighter than the sides, which are quite black. Hind femur on the inner side, including the lower sulcus, shiny black; lower inner genicular lobe very pale dirty yellowish, with slight reddish tinge. Hind tibia on the inner side black, on the outer greyish white; inner spines black basally and apically, and very pale testaceous in the middle portion; outer spines greyish white, black tipped. Hind tarsus greyish white, darker on the inner side. Underside of body light testaceous; abdominal sternites fasciated with black; last sternite almost wholly black except the middle portion.

♀ (*paratype*).—Generally agrees with the male in structural and sculptural characters. Coloration uniformly sandy-grey, with some greyish tubercles. Hind legs coloured as in the male, except that the inner spines are very light orange-yellow in their middle portions and the outer spines are yellowish on their inner sides. (Other paratypic females vary in general coloration, some having a light and dark pattern similar to that of the male; spines of hind tibiæ may be pure yellow, instead of orange-yellow.)

Length of body, ♂ 19, ♀ 43; pronotum, ♂ 5, ♀ 7·5; hind femur, ♂ 8, ♀ 13 mm.

Described from 3 ♂♂ (including the type) and 3 ♀♀ taken at Elma-Dagh, E. of Ankara, 16. v. 1939, by Professor F. Bodenheimer; and 1 ♀ from the same locality, taken 10. vii. 1939 by Mr. Tewfik Karabagh. Named in honour of Professor F. Bodenheimer as a tribute to his incessant work of zoological exploration in Palestine and Turkey.

A male specimen in the British Museum labelled "Amasia," and received from Brunner von Wattenwyl under the name *N. cyanipes*, is practically identical with *N. bodenheimeri* and certainly not conspecific with the Fisher-Waldheim's species, which even belongs to a distinct genus, *Nocaracris* (see Uvarov, Rec. Russe Ent. xxii. 1928, p. 149). Closely allied species, or subspecies, of *Nocarodes* were sent to me by Prof. Bodenheimer and

Mr. Karabagh from two other localities in central Turkey, but they are represented by single specimens, and I abstain from reporting on them until more material is available. There is no doubt that the genus *Nocarodes* and its allies are represented in Turkey by numerous local species and subspecies awaiting a thorough investigation.

LV.—*The Perciform Genera* Gymnapogon *and* Nannatherina. By C. TATE REGAN, D.Sc., F.R.S.

HENICICHTHYS FORAMINOSUS Tanaka, 1915, is a synonym of *Gymnapogon japonicus* Regan, 1905, p. 19. Tomiyama (1936, p. 50, fig. 9) has redescribed it under the former name and has given a figure which represents its main features quite well; but his opinion that this fish is a Gobioid appears to have influenced his drawing of the pectoral fin (base too broad) and caudal (rays too divergent).

When I described *Gymnapogon* I placed it in the Chilodipteridæ (=Apogonidæ), and using Jordan and Snyder's revision of the Japanese fishes of this family (1901) I put it near *Telescopias*, which it resembles in the slender fin-spines and lobate præoperculum. Later (Regan, 1915), when *Telescopias*, as a synonym of *Scombrops*, was transferred to the Pomatomidæ, it was accompanied by *Gymnapogon*. For some time I have had doubts as to whether this was justified, and have noted that the systematic position of *Gymnapogon* needed investigation. I have now re-examined the types of *G. japonicus*, several specimens up to 45 mm. long, have studied an alizarin preparation, and have dissected another specimen.

The results may be shortly summarized: *Gymnapogon* has none of the structural characteristics of the Gobioidea (Regan, 1911), but is typically Perciform. The skeleton is that of a Chilodipterid, not of a Pomatomid. It resembles the Pomatomidæ rather than the Chilodipteridæ only in having slender fin-spines; the large thin præopercular lobe has more resemblance to that of some Chilodipteridæ (e. g., *Dinolestes*, *Synagrops*) than to the short rounded lobe of *Pomatomus* and *Scombrops*.

When I diagnosed these families I had seen skeletons of all the Chilodipterid genera I listed and of *Pomatomus* and *Scombrops*. In the Chilodipteridæ there are two anal spines, the supramaxillary (=supplemental maxillary), when present, is narrow, and the posterior ribs are inserted on divergent parapophyses. In the Pomatomidæ there are three anal spines, slender, graduated, close together, the first very short and sometimes concealed, the supramaxillary is peculiar, broadest in the middle of its length and emitting a superior process, and the posterior ribs are inserted at the ends of parallel, downwardly-directed parapophyses. *Gymnapogon* has two anal spines, no supramaxillary, and 25 vertebræ (10+15), with the last five ribs on divergent parapophyses. The skeleton resembles that of *Dinolestes* as described and figured by Starks (1899), the principal differences being that the mesethmoid is shorter, ending not far in advance of the lateral ethmoid projections, the occipital crest is less developed, and the parietal crests are absent.

In form, proportions, and number of fin-rays *Gymnapogon* resembles *Chilodipterus*. The dentition also is like that of this genus and of *Synagrops* and *Dinolestes*. The nostrils are as in *Synagrops*, rather large, the anterior rounded, with slightly raised rim, the posterior vertically oval, not far in front of eye, But there are several external features that distinguish *Gymnapogon* from the other Chilodipteridæ, notably :—

(1) Scaleless.
(2) Head with a network of series of small pores ; body crossed by about 20 vertical series of similar pores.
(3) Lateral line proper of larger pores set well apart, double, the upper ending below soft dorsal, the lower along middle of side of tail.
(4) All the fin-spines slender, somewhat flexible, not pungent.
(5) Procurrent caudal spines well spaced, forming a rather long series above and below, each of about 10 spines.
(6) Pectoral higher ; upper end of base about equidistant from dorsal and ventral profile.

(7) Operculum without free upper edge, connected to pectoral arch by membrane (as in the Grammistinæ).

These peculiarities perhaps justify the recognition of *Gymnapogon* as the type of a separate subfamily.

Another fish that I had noted as requiring investigation is *Nannatherina balstoni* Regan (1906, p. 451), described from two specimens, 35 mm. long, from Western Australia. I attached considerable importance to the subabdominal position of the pelvic fins, with the pelvic bones remote from the cleithra, and I placed *Nannatherina* in the Atherinidæ. Since then I have reached the conclusion that in all fishes with pelvic fins of a spine and 5 soft rays, if the pelvic bones are not in contact with the cleithra this condition is secondary, and may be used to characterize either a suborder (*e. g.*, Mugiloidea), a family (*e. g.*, Tetragonuridæ), or one or more genera within a family (e. g., *Anabas*, *Spirobranchus*, etc. in the Anabantidæ).

I now consider that *Nannatherina* should be placed in the Kuhliidæ. It may be defined as nearly resembling *Kuhlia* in structure of head, mouth, teeth, and fins, differing especially in having præorbital and præoperculum entire, cycloid scales, no lateral line, and more numerous vertebræ (31 instead of 25).

In both genera the pelvic bones are in contact by their inner edges, and together form a triangle, which is acutely pointed in front. Dissection of spirit-specimens reveals that in *Kuhlia* the anterior part of the pelvic bones is enclosed in a fibrous sheath which is attached to the cleithra above the symphysis immediately in front of the apex of the bony pelvic triangle. *Nannatherina* differs in that the pelvic bones are remote from the cleithra, and are connected with them by a long ligament. The difference between the two genera is one of degree; in one a short and stout, in the other a long and slender, ligament connects the pelvic bones with the cleithra.

Both the Chilodipteridæ and Kuhliidæ are nearly related to the Serranidæ, and the differences between them in cranial structure would be considered of only generic importance in the Serranidæ. These differences concern the postorbital part of the skull. In the Chilodipteridæ the roof of the skull, behind the frontals, consists of a sort of platform in the middle, oblong in form, separating the temporal fossæ on each side of it. The upper surface of the "platform" is in the same plane as the frontals, or nearly; it is formed by the supraoccipital in the middle and by parietals and epiotics on each side; its lateral edges may be defined by slight parietal crests, and there is a low median occipital crest. The floor of the temporal fossa is formed mainly by the pterotic (=supratemporal), its vertical inner wall by parietal and epiotic; posteriorly it is bridged by the upper limb of the post-temporal and immediately in front of this by the lateral element of the occipital commisure (=supratemporal of Ridewood and of Boulenger, dermo-occipital of Regan, extrascapula of modern writers on fossil fishes). The posterior face of the skull descends steeply; here the occipital crest is well developed for a short distance above the exoccipitals.

In the Kuhliidæ the postorbital part of the skull differs as follows:—The anterior end of the supraoccipital, and of the parietal on each side of it, is on a level with the frontals; from this point backwards the cranial roof descends so abruptly that the greater part of these bones and the epiotics may be described as belonging to the posterior face of the skull; the occipital crest increases in height backwards throughout its length (*cf.* Boulenger, 1897, p. 35, fig. 4).

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Heredity. Third Edition. By A. FRANKLIN SHULL. London: McGraw-Hill Publishing Co., 1938. Pp. xvii+442. Price 21*s*.

PROFESSOR SHULL'S book, now in its third edition, has been almost completely rewritten in view of recent developments. The choice of topics is still guided by the consideration that a genetic phenomenon discussed shall occur in man or shall be related to economic features of plant or animal. But such phenomena have accumulated so rapidly that choice is necessary, and the book now takes the form of a general elementary treatise.

The purely historical method of exposition is not followed, and insistence is laid from the beginning on explanations in terms of the gene and chromosome mechanism.

The book covers a wide range, and one of its notable features is the abundance of remarkably clear diagrams in which the results presented strike the eye in such a way as to permit of instant and unambiguous interpretation. Another feature is the appendix of some hundreds of questions, by means of which the student may rapidly test his powers of assimilation. Some of these questions are intended to be answered by a simple "Yes" or "No," others are of the "missing word" type.

Problems of eugenics and population and race problems receive detailed discussion, and the book may be recommended as an introduction to the subject that may be read with profit by students of biology and by those who are more particularly interested in human affairs N. F.

General Physiology. Third Edition. By PHILIP H. MITCHELL. London: McGraw-Hill Publishing Co., 1938. Pp. xviii+853. Price 36*s*.

WHEN, a quarter of a century ago, the late Sir William Bayliss took 'General Physiology' as the title for his classic work he intended the subject to correspond closely with Burdon-Sanderson's "elementary" physiology, "the study of the endowments of living material"—a study to be cultivated for its own sake and not with an eye to its applications. The study demands knowledge both wide and special, and Sir William Bayliss's masterpiece has provided a norm for the teachers who have followed him.

Professor Mitchell has been mindful of the demands made on the student of physiology, who must have something more than a nodding acquaintance with surface physics, colloid science, physical chemistry, and organic and bio-chemistry. In the spirit of Bayliss's work, some nine or ten of the twenty-five chapters which make up the book are devoted to very clear expositions of the relevant portions of these subjects,—expositions which assume no more than a very elementary knowledge on the part of the reader

The work, now in its third edition, has been revised chapter by chapter, the most extensive changes having been made "in connection with excitation, contraction, chemical transmission, structure of membranes, the permeability of cells, physiological oxidations, the chemistry of muscle, the vitamins and the hormones." The list of these changes gives some indication of the topics handled, for, wide as is the scope of the work, a selection must be made, and the author's selection of topics has been governed by his desire to make the work useful to the student whose college curriculum can find room, on the biological side, for no more than one course in physiology. These limitations have made it necessary to omit any consideration of reproduction; nevertheless the author has produced a very comprehensive course, in which he has treated his science, in Bacon's phrase, as one of light rather than fruit—as a pure science rather than a branch of technology. Excitation, the functional unit, and the correlating action of the nervous system, reflexes and tropisms, receptors, digestion, circulation, respiration, oxidations and heat regulation, excretion and protein metabolism, dietetics and chemical regulation by the internal secretions—these chapter headings may serve to show something of the line of development and scope of the author's treatment.

It is almost unavoidable that there should be, here and there, in a story so detailed and so complex slight inaccuracies of statement, and it would, in a short review, give a wrong impression of what is a very scholarly and attractive work were a reviewer to dwell on errors of omission or commission. Nevertheless it may be useful to point out that the weight of a drop of liquid detached from a vertical tube should not be equated to the product of the perimeter of the tube and the surface tension of the liquid, and that a quantity which decreases linearly with temperature should not be spoken of as being "inversely proportional" to the temperature.

The book is admirably produced, and may be strongly recommended alike to the college student and to the general reader who has some knowledge of modern biological science.

N. F.

INDEX TO VOL VI.

Acanthophthalmus, new species of, 172.
Adoretus, new species of, 348, 349.
Agrilacanthus, gen. et sp. n., 160.
Alexander, C. P., on new or little-known Tipulidæ, 194.
Altha, new species of, 121.
Ampyx, new species of, 158.
Annandalia, new species of, 228–231.
Anomala, new species of, 347.
Anomochilus, new species of, 447.
Arrow, G. J., on certain genera of brenthid Coleoptera, 318.
Arthrolips, new species of, 29, 30.
Austrolimnophila, new species of, 218.
Barnard, K. H., on Abyssinian woodlice, 355.
Baylis, H. A., on a new species of Macropostrongylus, 313.
Bentheogennema, new species of, 37.
Bibliographical notices: 'A Facsimile of R. H. Beddome's Articles on Indian Reptiles, 1862-1870,' 128; 'The Invertebrates: Protozoa through Ctenophora' (L. B. Lyman), 248; 'Heredity' (A. Franklin Shull), 531; 'General Physiology' (P. H. Mitchell), 531.
Bledius, new species of, 344.
Burkenroad, M. D., on pelagic Penæidea from Denmark, 35.
Buxton, D. R., on Coleoptera from the Lake Rudolf Rift Valley, 337.
Carobius, new species of, 225.
Carter, H. J., on Australian Buprestidæ, 380.
Cassidaria, new species of, 294.
Cernosvitov, L., on some Oligochæta from Palestine, 438.
Chamæmyia, new species of, 267.
Clay, Theresa, on the Leiden Piaget Collection, 427.
Cockerell, T. D. A., descriptions and records of bees, 176.
Cosuma, new species of, 118.
Craterocephalus, new species of, 286.
Cubaris, new species of, 359, 360.
Cuneamya, new species of, 155.
Cyclopyge, new species of, 136.
Cyllœpus, new species of, 395–403, 407.
Delorachis, new species of, 122.
Dendrobæna, new species of, 444.
Dionide, new species of, 140.
Drepanacrella, gen. et sp. n., 222.
Elassogaster, new species of, 68–70.
Elonichthys, new species of, 462.
Eophila, new species of, 441.
Epiphragma, new species of, 219.
Euprosopia, new species of, 77–79, 81–86.
Falsomalthodes, new species of, 276.
Fraser-Brunner, A., on some fishes of the genus Acanthophthalmus, 170; on sexual dimorphism in the family Ostraciontidæ, 390.
Funchalia, new species of, 36.
Garstang, W., Størmer on the appendages of trilobites, 59.

Giraffomyia, new species of, 92, 93–95, 97.
Gorgonorhynchus, new species of, 433.
Gurney, R., on the biology of the copepod Diaptomus castor, 277.
Halictus, new species of, 176–185.
Harris, T. M., on some Jurassic specimens of Sagenopteris, 249.
Hemerobiella, gen. et. sp. n., 232.
Henry, G. M., on Timanthes Stål and Pirmeda, gen. nov., 321.
Heterocerus, new species of, 345.
Hincks, W. D.: preliminary key to the "Petrejus" section of the genus Passalus, 486.
Hinton, H. E., on some new Brazilian Microcylloepus, 236; on Abyssinian Coleoptera, 297; on the Bolivian species of Cylloepus Er., 393.
Hylæogena, new species of, 164.
Inmalthodes, new species of, 275.
Isophya, new species of, 522.
Kimmins, D. E., on new genera and species of Hemerobiidæ, 222.
Læmoglyptus, new species of, 275.
Leucopsis, new species of, 272, 273.
Lhoste, J.: Études sur quelques Scydmænidæ de Bornéo et des Îles Fiji, 186.
Limonia, new species of, 214–217.
MacDonald, R., on Gammarus (Marinogammarus) obtusatus and G. finmarchicus, 247.
Macromastix, new species of, 194.
Macroplectra, new species of, 119, 120.
Macropostrongylus, new species of, 313.
Malloch, J. R., on the Otitidæ and Phytalmidæ of the Solomon Islands, 66; on the North American genera of Chamæmyiinæ, 265.
Microcerous, new species of, 364.
Microcylloepus, new species of, 237–245.
Microdinodes, new species of, 301.
Microstagetus, new species of, 32.
Miresa, new species of, 127.
Moy-Thomas, J. A., *see* White, E. I.
Narosa, new species of, 120, 121.
Natada, new species of, 127.
Neotrachys, new species of, 165.
Niphadolepis, new species of, 126.
Nixon, G. E. J., on new species of Proctotrupoidea, 497.
Nocarodes, new species of, 524.
Notiobiella, new species of, 227.
Nusalala, new species of, 234.
Octotoma, new species of, 454.
Octuroplata, new species of, 453.
Omocena, new species of, 125, 126.
Oncifelis, new subspecies of, 351, 352.
Orthoperus, new species of, 33.
Oxychalepus, new species of, 451.
Oxynaspis, new species of, 468–472, 480, 483.
Pachytarsus, new species of, 274.
Parasa, new species of, 123–125.
Paratrachys, new species of, 168.
Passalus, new species of, 494–496.
Paulian, R., on Abyssinian Coleoptera, 26.
Periscyphis, new species of, 362.
Phlebodicha, new species of, 117.
Phrynichus, new species of, 374.
Pirmeda, gen. et sp. n., 325–332.
Plunomia, new species of, 270–272.
Pocock, R. I., on a new race of Puma, 307; on the races of Geoffroy's cat, 350.
Porcellio, new species of, 357, 358.
Probænia, new species of, 456.
Proetus, new species of, 159.
Pseudodinia, new species of, 269.
Puma, new subspecies of, 308.
Reed, F. R. C., on new Ordovician fossils from Girvan, 154; on Pliocene fossils from Cyprus, 293.
Regan, Dr. C. Tate, on the perciform genera Gymnapogon and Nannatherina, 527.
Reid, D. M., on Gammarus (Pectenogammarus) planicrurus, subgen. et sp. n., 287; on Amphipoda new to Britain, 335.
Rivellia, new species of, 72.
Sabrosky, C. W., on Chloropidæ of the Oriental region, 418.
Sacium, new species of, 27.
Sagenopteris, new species of, 250.
Scott, H., on Abyssinian Coleoptera, 1.
Scydmænus, new species of, 188–191, 192.
Sergestes, new species of, 38–53.
Shannonomyia, new species of, 221.
Smith, M. A., on a new snake from the Malay Peninsula, 447.
Sphingonotus, new species of, 55.
Stenelmis, new species of, 304.
Stenichnus, new species of, 187.
Stratiopiathius, new species of, 320.
Stroteroides, new species of, 120.

Telenomus, new species of, 501, 506–510.
Temnocthispa, new species of, 460.
Therapon, new species of, 284.
Théry, A.: Buprestides nouveaux, 160.
Thompson, G. B., on the lice of petrels, 103; on the type-hosts of the Mallophaga, 409; on Mallophaga from divers, 513.
Tipula, new species of, 196–213.
Tmethis, new species of, 57.
Totton, A. K., on new species of Oxynaspis, 465.
Trewavas, E., on new Papuan fishes, 284.
Tritonium, new species of, 205.
Tryphax, new species of, 118.
Uhmann, E.: Hispinen aus dem Britischen Museum, 449.
Uroplata, new species of, 457.
Uvarov, B. P., on new Acrididæ from Afghanistan, 54; on new generic names in Orthoptera, 112, 377; on new Orthoptera from Turkey, 522.
West, R. J., on new species of Limacodidæ, 117.
Wheeler, J. F. G.: notes on Bermudan nemerteans, 433.
White, E. I., and Moy-Thomas, J. A., on the nomenclature of fossil fishes, 98.
Whittard, W. F., on the Ordovician trilobite fauna of West Shropshire, 129.
Whittick, R. J., on some African specimens of Phrynichus Karsch, 366.
Wittmer, W.: neue Malacodermata aus der Sammlung des British Museum, 274.
Woodward, Sir Arthur Smith, on a new Palæoniscid fish, 462.
Xenochalepus, new species of, 452.
Zachobiella, new species of, 225.

END OF THE SIXTH VOLUME.

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